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THE "METHOD OF INFERENCE" IN FOREIGN LANGUAGE STUDY.
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CHAPTERS I AND II OF THIS EXTENSIVE REPORT STATE THE PROBLEM AND OBJECTIVES OF A PROJECT IN WHICH RECOGNITION IS GIVEN TO THE POSSIBILITY OF INSTRUCTING STUDENTS TO MAKE INFERENCES AS A MEANS OF EXTENDING THE LANGUAGE LEARNING BEYOND THE CLASSROOM, LANGUAGE LABORATORY, AND TEACHING MACHINE. FROM THIS BASIC CONCEPT EMERGED THREE PROBLEM AREAS DESCRIBED IN CHAPTER III AND DISCUSSED IN DETAIL IN FOLLOWING CHAPTERS. THUS, IV, V, AND VI ARE CONCERNED WITH THE FIRST PROBLEM AREA ON HOW TEACHERS MIGHT COMMUNICATE AND TEACH INFERENCE-MAKING TECHNIQUES TO PUPILS. THE "INFERENCEABILITY" OF FRENCH AS A FOREIGN LANGUAGE FOR AMERICAN STUDENTS IS THE NEXT PROBLEM AREA DEALT WITH IN CHAPTERS VII AND VIII, WHICH ALSO DESCRIBE INSTRUCTIONAL MATERIALS AND PROCEDURES. THE THIRD AND MAJOR CONCERN IS THE STUDENTS, AND CHAPTERS IX AND X DISCUSS SUCH RELATED ISSUES AS (1) TO WHAT EXTENT SEVENTH-, EIGHTH-, AND NINTH-GRADERS ARE CAPABLE OF MAKING INFERENCES, (2) WHETHER THEY CAN ADJUST RATIONALLY TO PROBABILISTIC INFORMATION AND TO CONTRADICTORY CUES, AND (3) WHETHER THIS WILL ENHANCE THEIR FOREIGN LANGUAGE ACHIEVEMENT. THE FINAL CHAPTER GIVES A SUMMARY AND STATEMENT OF FUTURE PROSPECTS. TABLES AND FIGURES ARE INCLUDED THROUGHOUT THE REPORT, AND FIVE APPENDIXES GIVE THE SAMPLE TESTS, AND ADDITIONAL TABLES OF INTERCORRELATIONS OF MEASUREMENT OF INFERENCE-MAKING, GENERAL ABILITY, AND FOREIGN LANGUAGE ACHIEVEMENT. (SS)

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Contract Numbers: OE 4-14-021 and OE 5-14-024

Aaron S. Carton, Director
with the assistance of
Nancy Magaud

1966

The Research Foundation of
The City University of New York

for

The Division of Teacher Education
The City University of New York

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DIVISION OF
TEACHER
EDUCATION
Of The
CITY UNIVERSITY
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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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A REPORT OF THE OFFICE OF RESEARCH AND EVALUATION

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Contract Numbers: OE 4-14-021 and OE 5-14-024

Aaron S. Carton, Director
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The Research Foundation of The City University of New York

for and on behalf of

The Office of Research and Evaluation
The Division of Teacher Education
The City University of New York
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At a try-out of one of the testing procedures used in this project an astute eighth grader discovered a way in which the instructions could be circumvented and the scores raised. He rose to his feet and told us about it. His candor was matched by the kindly tolerance of his classmate who rose to his feet and chided him saying: "Come on! They're psychologists trying to find something out. And they think they can help us learn better. Do it the way you're supposed to." As far as we could tell the class did, in fact, "do it the way [they] were supposed to."

The project owes its first debt of gratitude to these youngsters and their classmates in control and experimental classes in the seventh-, eighth- and ninth-grades at Southside Junior High School in Rockville Center, New York and at Quaker Ridge School and Scarsdale Junior High School in Scarsdale, New York. If they gained but a fraction as much from their contact with the "Inference Project" as those who worked with them gained from them,their efforts were not in vain. It would be pleasing, indeed, if our researches did, in fact, contribute to their better learning and the better learning of their younger brothers and sisters.

Dean Daniel Griffiths at the New York University School of Education faciliated in the preparation of the proposal and the activities of Phase I. Dean Harry N. Rivlin and Dean W. Virgil Nestrick of the Division of Teacher Education at The City University of New York provided the administrational support for Phase II. Professor Glen Heathers as Director of the New York University Experimental Teaching Center and Professor Albert J. Harris as Director of the Office of Research and Evaluation at The City University actively participated in the conduct of the project and provided it with much needed administrative and substantive assistance.

The Language Research Section of the U.S. Office of Education provided financial support for the two and three quarter years duration of the project. Mr. Augustus A. Koski, when he was a member of that Section, played a special role by helping to develop the concepts of the project and by his constant supportive and encouraging interest.

Professor Pauline Taylor of New York University served as a consultant on topics pertaining to French. Professor William Samarin of the Hartford Seminary Foundation served as a consultant on methods of linguistic inquiry. Mr. Manuel Arenas of the Wycliffe Bible Translators, who served as a native informant of Totonac in a demonstration of linguistic field procedures reminded all who were associated with the project in a personal, subtle and intensely human way of the importance of enhancing language learning for the proper conduct of human affairs.

The administrations of two school systems open-mindedly opened the doors of their schools to this novel and untested enterprise. Dr. Gerald Murphy, Principal at Southside Junior High School in Rockville Center, became actively involved in providing local administrative support. Mr. Philip Malamud, of the Guidance Department there, sought to integrate the project into the curricula of the school and cheerfully provided all the substantive data we required. At Scarsdale Mr. William Nichols, Principal of the Junior High School and Mr. James Grey, Dean at the Quaker Ridge School graciously accommodated all of our needs. Dr. Gladys Reigart, Guidance Counselor at Scarsdale, provided us with much needed data. Mr. Loren Shores, Chairman of the Foreign Language Department at Scarsdale High School, made possible emergency follow-up testing.

The burden of the project rested upon the shoulders of a small number of teacher-experimenters. These were Mrs. Mollie Merchant and Miss Normandie Rioux at Rockville Center and at Scarsdale they were Mr. Raymond K. Binder, Mrs. Betsy Schwartz and Miss Beth Pearlman, who replaced Mrs. Schwartz, in the Spring, 1964 Semester. Not only did these teachers courageously explore some unaccustomed procedures, and some modifications of unfamiliar educational objectives, but they also gave willingly of their energies and ingenuity in implementing the project. They tolerated, without a trace of resentment, the hectic intrusion of a testing program, the intrusion of observers and tape recordings in their classrooms, and the intrusion of detailed analyses of the very minutest features of their teaching practices.

The teachers of the "control groups," Mr. Lawrence Ferrara at Rockville Center, Mr. Douglas Fleming and Miss Anne Martin at Quaker Ridge and Mrs. Anne Hitch at Scarsdale heroically tolerated many intrusions into their classrooms without even the gratification of being allowed to know what the project was about.

The brunt of the work fell upon research assistants. Mrs. Nancy Magaud was with the project the longest. She participated in developing many of its ideas. She conducted much of the work in the schools. She prepared teaching materials, testing materials, taught lessons, and contributed substantially to the preparation of this report. Her contribution was substantial, indeed.

Mr. Peter Freund's special contribution was to the development of the Visual Inference Test. His work on this aspect of the project together with his services in testing and data processing warrant special mention. Miss Cynthia H. Almeida and Mr. Steven J. Gross were particularly helpful in the final data processing and analysis. Others who were associated with the project at some time are : Mr. Kenneth Altschul, Mr. Irving Bernstein, Miss Anne Kelleran, Mr. Julio de la Torre, and Mr. Samuel Wallace.

Dr. Maurice Lohman helped "worry" the data through the computer. Mr. Paul Barbuto supplied the programming.

Mr. Max Weatherly was the first secretary to the project, bearing the brunt of organizing it. Mrs. Ruth Bruskin was the last secretary and she endured the hectic days prior to its conclusion.

Dr. Esin Kaya, my wife, was not only compelled to accept the anxieties a director of a fairly complex project brings home with him, but she was frequently inveigled into providing, gratis and during off-hours, her expert consultative services as a professional research worker on matters of design, statistics, research administration, and psychological theory.

All who helped have earned the project director's gratitude. If the work is of merit, they deserve much of the credit. No one, however, but the project director can be held accountable for the inadequacies, fallacies, and errors that mar the work.

Aaron S. Carton
March, 1966

PREFACE

The exploration of "The 'Method of Inference' in Foreign Language Comprehension, Learning, and Retention" conducted under U.S. Office of Education Language Research Contracts No. OE 4-14-021 and OE 5-14-024 will be referred to as the "Inference Prospect Project."

The project had as its point of departure the notion that human beings are capable of making inferences in probablistic ecologies and that the foreign language learning situation is a setting appropriate for inference making. The details of this conception are described in the problem statement of this report, Chapter I "A Role for Inference in Foreign Language Learning." The formulation of the problem was developed directly from theoretical backgrounds and the related research data that were available to us. The review of the relevant literature is, therefore, incorporated in this chapter. The chapter is essentially a modified version of our original statement of the problem. The benefits of comments by a number of colleagues are incorporated.

The second chapter provides a statement of the objectives of the project. The project drifted somewhat from its original objectives. Some objectives were deferred or abandoned while new ones were adopted and achieved. An attempt to clarify these shifts is made in Chapter II.

Three problem areas emerged from our basic conception. The project thus found itself coping with independent issues which were, as far as the project was concerned, entirely interdependent. These different kinds of procedures are to be described in this report. In order to clarify the interdependence of the procedures, Chapter III consists of a log or general account of the conduct of the project. The content of Chapter III is essentially of interest from the administrative viewpoint, rather than from the technical or academic one.

Teachers comprised the first problem area. How are teachers to communicate inference-making techniques to pupils? How will they train pupils to use these techniques? The description of work in this problem area is segmented into three chapters. Chapter IV describes the nature of the inference process as it ought to occur in the foreign language classroom. It describes what the teacher was expected to make the student do and thus also pertains to the third problem area, students. Chapter V provides an account of the formal training to which participating teachers were subjected. Chapter VI consists of a description of the techniques developed for assessing teacher behavior which originated with a "feed-back" model of teaching. It includes the observations and generalizations derived from the teacher assessment.

The second problem area was the "inferenceability" of French as a foreign language for American pupils. Chapter VII, which reports on progress in this area, contains a description of the instructional materials and procedures that were developed and taught to pupils in the experimental classes. Chapter VIII describes some unexplored strategies for analyzing the inferenceability of French as well as some materials and procedures that were not completely developed or were developed too late for use in the project as instructional materials.

The third concern of the project was the major one, the students. The junior high school grades were chosen as the setting for the study. To what extent are seventh-, eighth- and ninth-graders capable of making inferences? Can they adjust rationally to probabilistic information and to contradictory cues? Can they learn to make inferences? Will this learning enhance their foreign language achievement? What are the consequences of our teaching procedures? Chapters IX and X are concerned with the measurement and evaluation of the inference process and its effect on foreign language learning. Chapter IX is a report of an exploratory study of the Visual Inference Test, which was conceived expressly in the context of the present project but which seems to promise uses beyond the scope of foreign language study. Chapter X deals with the measurement and evaluation of foreign language behavior in the context of the present study. Unfortunately, in this chapter a number of departures from the original research design are revealed. We have had to content ourselves with mustering evidence from fragmentary data using cross-checks when possible. Although the findings are somewhat inconclusive, more is known about the inference process and its possibilities in foreign language study than if no evaluation had been attempted.

Chapter XI consists of a summary and statement of future prospects.

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Chapter I

STATEMENT OF PROBLEM AND BACKGROUND

A Role for Inference in Foreign Language Study

It would be hopeless to try to teach every word, every grammatical structure, every construction, or every peculiarity of usage to the student of a foreign language. If students are ever to master a language, there must be some processes by which they can learn by themselves. They cannot succeed by merely learning what is taught in the way it is taught.

Inference making -- which we will take the liberty of calling "inferencing" -- seems to be one process through which language learning is extended beyond the classroom, the language laboratory, or the teaching machine. This chapter discusses the possibilities for using inference making in foreign language learning and suggests some problem that require research, if it is to be used.

An inference is defined here as a particular variety of response. It may occur when an individual encounters an unfamiliar stimulus. *The inferential response is characterized by the fact that familiar attributes of the novel stimulus, or the context containing the stimulus, elicit a concept on the part of the individual*. The existence of the concept is, of course, realized only in the nature of the response. The concept may or may not be a novel one but it may mediate any of a variety of responses, such as a translation, an utterance in the target language, an act, or a change in attitude. Inference in this sense seems to be a tentative kind of knowing, based upon partial information that is recognized as such.

The term "inference process" will refer to a chain of events consisting of (a) the prior learning history of the responding individual; (b) an encounter with familiar and unfamiliar attributes of a novel stimulus and the context in which it occurs; (c) the conceptualization in which prior experience is linked with the novel stimulus (occurring as an unobservable "intervening variable"); and (d) the response or group of responses reflecting the conceptualization. There may be several cycles of scanning and re-scanning the novel stimulus, of the context or environment of the stimulus and of the memory store of prior experience before a satisfactory response is developed.

An example of the operation of the inference process in a language learning situation is borrowed and adapted here from a paper by Scherer, et al (1963). The example illustrates how the "meaning" of a novel word in a foreign language may be inferred. A student who has not been exposed to the German word, Bett is presented with the sentence:

Ein Bett ist zum Schlafen.

Let us assume his knowledge of German will enable him to comprehend the rest of the sentence.

A_____________is for sleeping.

The context now provides the possibility for making a very probable inference. For not only is the function of Bett revealed in the sentence, but the grammatical marker ein (English: a) signals the form-class of the word. Further, some familiarity with German-English phonetic and orthographic correspondences (such as t = d) might permit the same inferences to be made on the basis of the attributes of the unknown word. Certainly confirmation of the inference is warranted on the basis of context.

Inference, as it is defined here, and transfer of training as it is used in the psychology of learning (Osgood, 1953) may seem to be synonymous terms. Both terms refer to formulations that seek to explain and predict the occurrence of appropriate responses in novel situations after training has occurred in other situations. Indeed, since transfer is sometimes explained as the emission of responses developed in the original training in the presence of the same or similar stimulus elements in the novel stimulus situation, the definition of inference given here may be considered to be essentially an explication of one of the forms of transfer.

There are, however, certain necessary distinctions to be made between inference and transfer that make it defensible, indeed, desirable, to retain separate terms. The first distinction arises from the fact that the two formulations were generated by different theoretical positions. Thus, in the formulation of inference an intervening concept is to be posited, while the formulation of transfer of training is at least neutral in respect to the positing of concepts, if not antithetical to it. Second, inference may not only generate novel responses, but the positing of concepts (which may also be novel) provides for the selection of responses from a variety of possible ones that will be appropriate to the task confronting the individual (i.e. the response may be a translation or utterance in the foreign language, etc.). Transfer refers to the emission of responses already in the individual's repertoire, or to slight reshaping of old responses. Third, transfer seems to refer to passive responsiveness while inference is defined as consisting of active scanning and re-scanning of the environment. Fourth, the appropriateness of responses elicited by sheer transfer will be contingent upon which _elements_ in the novel stimulus elicit the old responses. Incorrect responses must be followed by additional "discrimination" learning. Inference, it will be seen, is posited as occurring with some assessment and anticipation of the appropriateness of a response. Further, there is tentativeness or perhaps a "set" for further learning that is proportionate to the individual's perception of the probability that the response may be incorrect. Finally, the concept of transfer emanates from a theoretical predilection for explaining all learned behavior for all members of the phylogenetic scale with the same theoretical constructs. Thus all transfer that may be observed in humans is seen as continuous with transfer that is observed in rats. The formulation of inference emanates from a belief that psychological constructs must be added to explain behavior occurring in organisms higher on the phylogenetic scale. From this point of view, it would be surprising to find inference occurring in many organisms lower than human on the phylogenetic scale. Both inference and transfer are seen as occurring in humans, although the similarities between the constructs may be considerable and the relations in the operation of the processes may be more subtle than can be at present anticipated.

The term "unconscious inference" has been used in English to translate the German expression _unbewusster Schluss_ (Boring, 1929). The early German psychologists, Wundt, Helmholtz and others, used this expression to designate the perceptual process that accounts for every recognition of _known_ or familiar objects or events. According to their formulation we know something to be what it is as a consequence of a very rapid, irresistible, "unconscious" integration of sensed attributes into the concepts that are available to us as a consequence of earlier experience.

Although there may be some question as to whether the notion of unconscious inference supplies an adequate or proper account of how recognition occurs, certain similarities with the inference process referred to here must be acknowledged. Both notions hold that "knowing something to be what it is" requires, of course, an encounter with the environment. Next, there seems to be a connection between the immediately present sensory information and prior experience or "knowledge" stored by the individual. Further, in each process there may be an establishment of tentative connections and repeated re-scanning of the environment and the store of prior experience to confirm or reject the posited concept. For Helmholtz the re-scanning process was important in the correction of illusory perception. It is held here that cycles of successive approximations leading to increased certainty are common occurrences in all inference making.

There are some differences to be noted between what was called unconscious inference and the kind of inferencing proposed here as part of the process of learning a foreign language. Basically, unconscious inference refers to the recognition of familiar stimuli, roses, or familiar people, or the sounds of one's native language or the familiar words of that language. It is assumed to occur with split-second rapidity as it pertains to the unconscious integration of the myriad, unfractionated sensory attributes of non-verbal experience. (Certainly no verbal mediation occurs in identifying the sounds and words of one's language). But the inferencing that is to play a role in language learning is the cognition of unfamiliar stimuli. It is anticipated that students will use the process deliberately -- or consciously -- and that the process will occur more slowly. In the inferencing of foreign language learning sensory attributes of the stimuli will be fractionated and distinguished. At least some verbal mediation will occur for some individuals, as there are those of us who will whisper sentences to ourselves in identifying even a speech sound in a foreign language.

Inferencing in learning a foreign language is also somewhat different from formal inference as the term is used in the parlance of scientific method, law and logic. In the latter domain, the term refers to the process by which conclusions, generalizations, or predictions may be made on the basis of available and explicitly admissible evidence. The process of following the canons of good method or logic is generally a very conscious, deliberate and laborious one. Logical syllogisms, truth tables, symbolic formulations and the like are frequently employed. Even if "intuition" is brought to bear upon an investigation -- and in actual usage intuitive logic plays a significant role -- a demonstration of formal logical validity is obligatory for the justification of any inference. In foreign language learning, however, perfect formal rigor may not be necessary. On the contrary, it requires a much more rapid rate than formal inference can permit, and there must be considerable tolerance for tentativeness and uncertainty.

Further, formal inference seems to occur when there are several instances of concurring evidence that is of the same character. It depends on complete analogies or replications of certain conditions. It generates statements such as: Since x_a, or x_b, or x_c are of the nature y in conditions a, b, and c, then x's are of nature y. This kind of inference occurs when grammatical regularities are induced from examples. In the early stages of the project it was believed that grammatical induction of this kind and inferences of lexical or morphological units from their contexts or internal structure were the same kind of process. Analysis and experience revealed, however, an important distinction that is described in Chapter IV. It is a distinction to be made between the availability of a variety of cues that are merely not contradictory and replications of concurring cues that all belong to the same category. The project became more interested in the former type of inference; the type in which there is less certainty; in which cues can, at best, be only partially validating.

It is true that scientific inference is also probabilistic. For the function of scientific statements -- unless they are definitional or taxonomic is the reduction of the uncertainty with which predictions, generalizations or conclusions may be made. While the canons of logic, rigorously followed, are believed to facilitate the reduction of uncertainty, the rules of many forms of scientific inquiry are explicit in holding that the only kinds of statements that can be made about nature are probabilistic ones. Scientific tests for regularities in nature are made against the assumption that randomness would obtain in the absence of the rule.

Therefore, scientific findings are frequently accompanied by assessments of the probability of their truth. Thus all scientific sentences are tentative and rules apply only with varying degrees of certainty to varieties of situations. Yet inferencing in foreign language learning is perhaps more probabilistic than science, law and logic are. Certainly, it must be more tolerant of breaches in rigor than these can be.

Probability and chance are also tolerated in our perceptual processes. When we are embarrassed by mistaking a stranger for someone we know, or inconvenienced by losing our way on a route that seemed familiar, we suffer the consequences of erroneous inference -- perhaps unconscious inferences. No doubt we demand relatively high levels of certainty before we act -- and the consequences of our acts affect the levels we demand. Perfect certainty, however, is hardly ever required for action, unless it is merely subjectively experienced; then it may still be objectively fallacious. The requirement for real (perfect) certainty at all times would be totally immobilizing. In communication, either in a mastered or incompletely learned language, it has been discovered that probabilistic inferencing plays a very important role.

Inference in the Communication Process

As early as the 1890's, Ebbinghaus (1897) deleted syllables from a German translation of Gulliver's Travels and asked school children to replace them in an effort to measure relative levels of fatigue in mental functions. The test proved to be a poor measure of fatigue, but he noted that it had high relationships both with age and excellence in school performance. Later, reading specialists attempted exercises in which "unimportant" words were omitted in an effort to increase reading rate. Students were to ignore words that did not add information.

The notion that segments could be deleted from samples of text, and could be replaced with varying degrees of success by persons guessing at the nature of the deleted segments, was eventually developed in a very sophisticated mathematical fashion in the form of information theory (Hockett, 1953). Shannon and Weaver (1949), for example, showed that there are measurable contingencies (called transitional probabilities), which range from zero to unity, among strings of units in messages transmitted in any code. For example, (t) is more likely to be followed by (r) or a vowel than by (z) or (x). Thus an experimental subject playing Shannon's "guessing game" (Shannon, 1951) will meet with varying degrees of success in attempting to predict the next letter in an English text after a string of preceding letters. The degree of his success will depend mainly upon the transitional probabilities existing between the letter to be guessed and the letter preceding it. But probabilities conditioned by letters occurring earlier in the string also play a very important role. When (t) is preceded by a space or a vowel, (r) may follow, but when (r) precedes (t) then only (h), (s), (y), a vowel, or a space may follow.

To the information theorist, predictability implies "redundancy" or the absence of the transmission of new information. Estimates of the degree of redundancy in printed English texts range from 25% to 75% (Chapanis, 1954; Miller, 1957; Burton, 1955). Information theory and descriptive linguistics were found to have many affinities for each other (Hockett, 1953). Grammatical constraints seem to be a major source of redundancy.

Wilson Taylor (1953), in an effort to develop a scale with which to index the relative "readability" of texts, has chosen to delete words at random from texts, rather than letters. He asked panels of readers to attempt to replace them. Taylor's "cloze" or readability scores, computed as a function of the number of guesses which correspond perfectly to the omitted words in the original text, correlated well with other measures of readability and seemed to be a valid measure of the concept of readability. Like Ebbinghaus, Taylor (1957) also discovered, however, that the ability of readers to replace deleted words is subject to considerable individual variation and that this variation is highly correlated with intellectual functioning.

The Relation Between Inferencing and Comprehension

It subsequently occurred to Yngve (1954), Bruner (1957), Brown (1958) and Taylor (1956) himself, that "knowledge" of the transitional probabilities of a language, as reflected by the ability of an experimental subject to replace deleted units or segments in mutilated texts, may prove to be an index of the subject's degree of mastery of that language.

Fortified by an earlier finding of Carroll (1941) that a test of "Phrase Completion"(which bore considerable resemblance to cloze items) was one of the purest measures available of "V", or the verbal knowledge factor, Carroll, Carton, and Wilds (1959) undertook an investigation of cloze items in the measurement of achievement in foreign languages. In the very first study conducted in this investigation it became apparent that individuals with varying, but relatively high levels of competence in two languages manifested an "ability to do cloze items" in either language. This ability seemed to account for a great portion of the variance in scores and it seemed to be independent of proficiency in the languages. This investigation also confirmed the fact that cloze scores were related to intelligence. For this and various other reasons, the investigators did not recommend the use of cloze items as a technique for measuring foreign language proficiency.

The study by Carroll, Carton and Wilds found further that cloze scores were subject to extraneous sources of variance such as paragraph cues. Prepositions and adverbs proved to be less susceptible to paragraph cues than nouns and verbs. A later study by Carton (1959), however, revealed that when paragraph cues were completely eliminated and grammatical descriptions of the deleted words were given considerable weight in the scoring of responses, cloze items as tests of foreign language proficiency might exhibit correlations ranging from .56 to as high as .70 with standardized achievement tests of auditory comprehension. Thus, the varying ways in which subjects use cues confounds cloze procedure as a measure of foreign language knowledge. Comprehension apparently depends on both language knowledge and the ability to make use of all kinds of cues. And the information theorist is mistaken if he holds that predictability is determined only by redundancy in code.

The findings cited above all seem to indicate that the ability to replace deleted words in continuous text depends to a considerable degree on an ability to make sense of the content of the communication, in addition to, and independent of, mastery of the language. In all social situations a certain amount of "interlocutory tolerance"[1] may be said to exist between speakers. Thus successful communication can frequently occur despite considerable omission of crucial referents. L.S. Vigotsky (1962), preserving a distinction between meaning and sense, attributed the ability of speakers to communicate with each other (despite drastic omissions of words or elements that would seem to be necessary for their sentences) to the fact that the thinking of these individuals progressed in a parallel fashion. Vigotsky maintained that thought and language proceed to a considerable degree independently of each other for an individual. Endophasic, or inner speech, which is perhaps the vehicle of thought, is very different in its properties from social speech and the two become interrelated only at certain points. The view held by Vigotsky regards the comprehension of a thought to be quite different from comprehension of words. This notion alone may constitute a point of departure for examining the role of inference in foreign language learning.

In reading a text in a foreign language which is not perfectly mastered, it would seem that the occurrence of a word which was not previously learned and which contains in itself no internal cues for the receiver is analagous, in many ways, to a deletion which occurs in a cloze test. It may, therefore, be reasoned that the ability to comprehend the text would depend partially upon the same ability or upon an ability similar to the one which was believed to confound the cloze procedure as a measure of foreign language proficiency.

In addition to making use of his understanding of the content of a passage, a sophisticated reader might, in cases of cognate lexical items, also make use of his knowledge of the regularities of changes and other cues for etymological derivations between languages he already knows and the language in which he is reading. While Carroll, Carton, and Wilds, as a result of their investigation, rejected cloze procedure as a measure of what a student might have learned in his foreign language study, their exploration has not shown that cloze procedure fails to predict how much a student will be able to comprehend despite gaps in his knowledge of a foreign language. Generally, the configurations of the relationships seem to point to the possibility that comprehension in an imperfectly mastered foreign language may at some point in the training process be more effectively enhanced by some effort devoted to learning how to make inferences effectively than by a comparable amount of effort devoted to acquiring a specific set of lexical items or grammatical rules.

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[1] I am indebted to Irving Carton for first suggesting this term.

The Present Role of Inference in Methods of Foreign Language Education

In foreign language education, many methods of instruction implicitly require the student to learn by making inferences, although it is doubtful that any have explicitly identified the process by which the learning takes place. The so-called "direct methods" of foreign language teaching (in which the target language is exclusively used) depend considerably upon active efforts on the part of the student to guess the meanings or functions of linguistic forms in the target language. The ability of the student to make inferences and the skill with which the instructor or the syllabus organizes the materials to enhance the probability a student will make correct inferences rapidly no doubt contributes to the relative successfulness of the method. Despite the fact that exclusive use of a direct method must inevitably include many of the cumbersome features, the success of many attempts to teach foreign languages this way is apparently satisfactory enough to evoke vigorous, partisan support by those who use this approach.

Efforts to teach foreign languages by means of carefully prepared programs of instruction generated by the Skinnerian behavioral analysis have met with varying degrees of success. The quality of these programs is said to be a crucial factor. The scientific discourse which describes the process of learning that occurs in programmed instruction does not invoke the notion of inferences. Rather, the description is expressed by a paraphrase which leaves open the question of an intervening psychological process. "Operant responses," available in the repertoire of the learner and evoked by cues presented by the program, become associated with those cues. Learning in the presence of program proceeds, ostensibly, by means of reorganizing behavior that the learner is already capable of or by successive approximations called "shaping" in a manner that is perhaps theoretically analogous to the reorganization, refinement, or expansion of posited cognitive structures of the cognitive theorist.

Inferencing is implicit in programmed learning. When programmers urge that only "snall steps" be permitted from frame to frame they are asking for the introduction of novel stimuli in the context of many well known stimuli.

An extensive review of programmed instruction in connection with the foreign language field may be found in a paper by Carroll (1962). Two additional ventures, not completed at the time of Carroll's review are, however, particularly relevant here. The techniques used in these explorations clearly exploit the process of inference in a systematic manner, despite the fact that the investigators might not subscribe to this analysis. At System Development Corporation, Gerald Newmark (1964) trained elementary school children in French and Spanish to respond to auditory items in the target languages in which extremely obvious cues for questions are given by means of audio-visual media. Newmark used audio-visual aids to supply dramatic or humorous episodes in the target language in which, it would appear, the language learning seems almost to be an incidental feature. Using these techniques, Newmark was able to devise a program in which the mean score for seventh grade pupils on a criterion test measuring listening, reading, writing, and speaking was 86% of the maximum after spending an average time of 4 hours and 23 minutes on the program.

The second study, although complete, must be regarded as only an exploratory venture since the sample of subjects is extremely small (N = 3) and the question of experimental controls was evaded, perhaps because the problem of selecting of the appropriate controls seemed insoluble. Yet, H. H. Schaefer (1963) achieved extremely impressive results in teaching German vocabulary and grammatical structure by presenting the German materials in English contexts which made the significance of the German items obvious. Several hundred German vocables were learned by Schaefer's subjects on the basis of a very small amount of prepared materials and the subjects progressed pleasantly from materials in which only occasional words were in German and the linguistic structure was that of English to texts which were entirely in German. Schaefer included a large number of English-German cognates among his materials thus the source of cues for infering these items was not language redundancy, although they were classified as such.

The widely used audio-lingual approach to foreign language teaching makes extensive use of the inference process. The main use is in the instruction of grammatical regularity. One very popular course in French, "The Audio Lingual Materials," however, makes extensive use of French-English cognates when reading is introduced. Words that may be legitimately inferred are specially marked and students are encouraged to assume their meanings.

In the "pattern practice" drills the various applications of the audio-lingual approach employ, students are expected to induce grammatical regularities from series of presented examples. The inference of the rule, however, is secondary to the development of grammatical behavior and is regarded merely as an aid toward achieving this goal.

In this form of language teaching -- and indeed in many of the more "traditional methods" -- students are frequently required to produce grammatical forms or syntactic structures they have never encountered. Each new instance of verb conjugation, for example, requires an inference from the available form of the verb and the known regularities of its behavior to the production of an unknown form, but this kind of inference is of the formal type of inference discussed above. Thus it may be seen that inferencing occurs not only in the receptive domain of language behavior; it occurs in production too. An occasional error in grammer -- as when a child says "I knowed it" -- may be attributable to an occasional error in the application of the inference process or (if we are to be fair about it) to misbehavior in the language.

On the other hand the production of new lexical forms by inference is very unlikely even if an occasional unconventional individual may "get away with" an occasional coining that becomes a legitimate linguistic form.

A Defect In These Methods

The most serious defect in the direct method, in programmed instruction, in the audio-lingual pattern-practice approach, or any approach which involves inferencing without explicitly identifying it, lies in the fact that these methods rely upon the student to use the process, but do not teach him anything about the nature of its use. Such methods fail to educate the student to continue his language study independently or to prepare the student to attempt the study of a new language with well developed tools of inquiry. In the direct methods, the use of inference occurs in artificial and contrived situations which bear only superficial resemblance to actual communicative situations. In programmed instruction, the probability that the student will exhibit a correct response at every point in the program is intentionally kept very high by a priori analyses of the materials fortified by careful, empirical pre-testing. The student who learns a foreign language by means of programmed instruction may never learn anything about his process of learning and may always need to rely on programs to learn new materials. This holds for the audio-lingual-pattern-practice approaches as well.

It seems reasonable to predict that those students whose experience in using the inference process is limited to educational situations in which there is no explicit cognizance of its use will either refuse to make inferences or may make reckless and inaccurate inferences when confronted with episodes or texts in imperfectly learned foreign languages. There is, however, nothing in the theory or nature of audio-lingual methods or of programmed instruction which prohibits the writing of programs, lessons, or segments of programs designed expressly to train students to make good inferences. It need only be kept in mind that the identification of the relevant variables in direct experimental tests must precede the preparation of such programs, lessons or items.

Inferencing and The Psychology of Language Learning

(A) Native Language Learning and Bilingualism

The kind of language learning a child does seems to have some important advantages for the quality of skill that is eventually acquired. We speak our native language with a fluency that is rarely achieved in a second language. We are most of the time unconscious of how we use it; we are conscious mainly of what we use it to say. Were it not for grammar teachers or the need for teaching our language to others, most of us would never become aware of very many of the structural features and linguistic regularities of our language.

According to some theorizing (Ervin and Osgood, 1954) and supporting experimentation (Lambert, et al, 1958), learning a second language through the use of the native language leads to cognate bilingualism. Mental functioning in this kind of bilingualism is seen as comparatively awkward; it requires the extraneous mediation of the first language in every attempt to say something in the second language. "Coordinate bilingualism" is more elegant. Since one language does not supply mediators for the other, two linguistic systems may operate independently, or without mutual interference, within the same individual. There are no marked differences in fluency between the two languages. Coordinate bilingualism is achieved when one language does not mediate in the teaching of another. A coordinate bilingual need not translate to himself.

The fluent kind of language behavior associated with native speech or with coordinate bilingualism seems to be generated by a process of trial and error. In learning a native language (Carroll, 1960) evidence points to the fact that sounds, words and grammatical features are inferred and tested for their appropriateness. It has been shown that children infer constructions that are analogous to morphological patterns of the language (Berko, 1958). Coordinate bilingualism, it seems, is most likely acquired when two languages are learned in childhood in actual use (Lambert, et al, 1958). It seems safe to assume that the learning of structure, and of lexical connotations and denotations occurs in the context of other linguistic material through a process of inference. Evidence indicates that this process leads to usage that is truly characteristic of the language being learned rather than imperfect translations of a language that is already known.

(B) Learning in the Classroom

Educational lore frequently leads teachers to say: "Let your pupil work it out for himself and he will remember it better." A relatively broad psychological principle seems to generate remarks of this nature. The general statement of the principle might take the following form: if the acquisition of a particular item of information requires the learner either to circumvent some difficulty or to make an inference, the information will be retained longer and with greater accuracy than it would be were it learned through direct presentation. Further, fewer presentations of new information are required when the learning occurs through inference than when it occurs as a result of direct presentation.

It is surprising that the major reviews of psychological literature on learning theory and data (Hilgard, 1956; Hovland, 1951; McGeoch and Irion, 1952; Osgood, 1953; Spence, 1951) do not speak of a direct test of the proposition, although a concern for pedagogy immediately evokes the issue. Processes such as inference in psychological literature in chapters on "problem solving" or "thought" are discussed. The compartmentalization of the areas seems to have prevented a direct test of the role of problem solving in learning. Otherwise there would be experimentation with such devices as the learning of paired-associates through crossword puzzles or with the recall of the position of pieces on a chess board in the context of a hotly contested game.

There are, however, many notions extant in the psychological literature which might account for faster learning and longer lasting retention as a consequence of inference making in the learning process. These notions do not prove that learning through inference is more effective. Such proof remains a matter of empirical test. The citation of these notions only argues for the reasonableness of the assertion. Should learning through inference be shown to be more effective than other kinds of learning, these psychological underpinnings would provide a point of departure for further research.

Among the relevant notions in the psychological literature is the idea of mnemonics. Some descriptions of memory appeal to a model which likens the retention of facts to links in a net comprised of interwoven chains. Each link is mnemonic for all the links it is connected with. When an item is recalled to consciousness it makes more probable the recall of other items that are linked or associated with it. If these models have any validity, it may well be that inference making in learning brings the mnemonics along with the learning. Thus, there is apt to be a recollection of the salient events and processes attendant upon the learning. But more importantly, inferencing is defined as requiring the scanning of what is already known by the learner in the establishment of new concepts. The process inherently requires linking of new material with what is already known. The total effect is one of increasing the probability that any particular link will be remembered.

Inferencing is also a process that requires more active learning than simple rote memorization. Psychological and educational literature is replete with argument that active learning is more effective than passive learning.

Further, it may well be that a moderate amount of relevant emotional excitement attendant upon learning is conducive to better retention (Bugelski, 1956). Again it may be argued that the requirement to make inferences may stimulate precisely the appropriate emotional excitement. It may well be that on the level of physiological correlates of learning, attendant emotional excitement is the same as, or functions analogously with "reinforcement." When theorists, who insist that reinforcement is necessary for all learning, speak of "implicit reinforcement" or the sense of reward that is posited to occur with knowledge of correct results. they may be speaking of something similar to the attendant emotional excitement that accompanies learning through inference.

It must be added, however, that the role of emotion in learning is extremely complex. There seems to be a level of emotionality which constitutes over-excitement and interferes with learning. The specific emotions are probably relevant to learning specific kinds of materials. Many personological variables, such as achievement motivation, anxiety level, authoritarianism, etc. seem also to play a role. Only very recently has the exploration of the neurology and physiology of these processes begun to meet with any success and our understanding of them is still poor.

Inferencing can add salience to novel stimulus configurations. By definition the salient features of the environment are ones we notice and remember. Sometimes salience is mainly a function of properties of the stimulus, sometimes the process of perception generates the salience.

On the other hand it is conceivable that some learning through inference occurs completely unnoticed as it does in learning without awareness or even as a consequence of subliminal perception. This might occur when an unknown stimulus element is embeded in what is otherwise a completely familiar and comprehensible context. Although the viewer does not become conscious of the unfamiliar element some trace of it might remain in his memory. The element might occur again and again in familiar contexts. Completely unaware, the viewer may induce a hypothetical concept of the unfamiliar element and confirm his hypothesis on the basis of whether it fits the contexts of subsequent encounters. Thus it may come to pass that the viewer gets to "know" the element before he knows he knows it. While there is little experimentation to confirm this notion there are data on "learning without awareness" and on "subliminal perception." The experience seems to be familiar to anyone who has learned new words from their contexts.

Cognizance of this phenomenon of unconscious learning is useful in preparing materials by which students may expand their vocabularies painlessly (Scherer, et al 1963) and extend their control of grammatical structures. But it is doubtful that educational technology, at least at its present state of development, can contribute much to the improvement of the process of unconscious inferencing discussed above. There are few, if any, known procedures for enhancing unconscious mental processes. Perhaps because of its very nature, unconscious learning becomes conscious when it is manipulated. Thus while further study of unconscious inferencing in foreign language study is desirable, it does not at present seem feasible to attempt procedures for developing it. Instead, our concern should be with helping students to make inferences in a conscious fashion.

Finally, motivation. There are those who argue that learning will not occur without motivation. Certainly the fact that motivation enhances learning is universally acknowledged (although the inhibiting effect of "over motivation" is also to be taken into account). A "set" to find one or another feature of the environment or to solve a problem is one kind of motivation, while a "set" to learn for the sake of rewards that will accrue from the knowledge is probably a different kind. When students in the classroom are rewarded by grades, and promised power over their environments in the form of competence, prestige or economic rewards, an attempt is made to utilize the second type of motivation.

When a student accepts the assignment to make inferences he may do so in the context of this second kind of motivation but each episode of learning through inference has its own motivation or "set" built into it. There is evidence that at least for some individuals the very encounter with a problem of reasonable difficulty is motivating (McClelland, 1953). It is this kind of intrinsic motivation that seems to be called into play in learning through inference, and it seems to remove much of the drudgery that sometimes accompanies the learning process.

We may conclude that enough psychological theory and data promise that learning through inference leads to longer retention and is more pleasant than rote learning. If initial investigations of learning foreign languages through inference prove successful, extensive and close exploration of the notions suggested here (and any omitted ones that may also seem relevant), should become matters of central concern in the educational psychology of foreign language learning.

The Technology of Inferencing In Foreign Language Study

There are two sets of variables to be explored by standard research methods if a technology of inferencing in foreign language study is to be developed. The first set of variables relates to the learner; his propensity for making inferences, his tolerance of risk and his ability to make valid, rational, and reasonable inferences. The second set of variables are ecological. They relate to the language to be learned, when and whether inferences can ever be made with perfect validity and when and where rational inferences of high probability can be made. Without an exploration of these, any attempt to utilize inferencing in foreign language learning may prove more detrimental than helpful to the language learning process. Even initial investigations of the role of inference in foreign language learning should not be undertaken without cognizance of the variables.

From the point of view of the learner there is first the question of valid inferences. The canons of logic and good observation -- that is the canon of science -- are relevant here. It should be obvious that correct inferences are not necessarily arrived at by valid procedures. Luck may sometimes be favorable. But we hope that our systems of logic obviate most incorrect inferences that are invalid. And, as we have noted, scientific inference might be accompanied by an assessment of the probability of its being correct. Connected with logic and good observation are the psychological phenomena we frequently call intelligence. At present we are completely ignorant of the minimal level of cognitive functioning requisite for inferencing in foreign language study.

Some preliminary investigations already conducted by the author (Carton, 1960) with this problem warn of the importance of healthy cognitive functioning in inferencing. Analysis of a preliminary form of a test intended to measure "willingness to make inference" revealed items that seemed to measure "readiness to project" instead of inference. Confronted with a completely unstructured stimulus field, the most healthy of individuals will manifest some "projection," or the expression of personal needs rather than accurate perceptions. But projection is sometimes a neurotic mental process. It yields faulty perceptions of reality. In disordered individuals it will manifest itself even in a situation of the slightest ambiguity. In a situation which requires inference of a probablistic nature, a projection may easily pass for an inference. Experiences with inferences that are correct only by chance, and arrived at as a consequence of projection, may encourage the application of a distorting mental process and may put the pupil at a disadvantage for future encounters with inference-requiring situations.

A literature on risk-taking (Kagan and Wallach, 1964), has brought to light a number of factors that are relevant to inferencing in probabilistic situations. Studies and analysis reveal that there are relationships among consequences of chosen acts, the values of these consequences, and the probabilities of the consequences. For example many people chose to fly in airplanes to reach their destinations quickly. This consequence is highly valued. The alternative consequence -- that of dying in a crash -- is much to be eschewed. But the probability of the positive consequence is high and of the negative consequence is low, so people tend to fly in planes. If the probability of crashing were very high, few people would fly, even if they very much wanted to arrive quickly. If a person is in no hurry to arrive at a destination, even the slightest risk may be enough to dissuade him from using this form of transporation.

Thus the "pay-off" matrix of decision theory seems to provide a framework for establishing the rationality of a decision. The decision to make an inference in foreign language learning may be assumed to fit the pay-off matrix. The probability and value of being right is to be weighed against the value of the consequences of being wrong.

Psychological investigation to date reveals that responses to the pay-off matrix vary considerably from individual to individual according to "personality variables" and vary within the individual according to factors of motivation, experience with success or failure, and many others. A technology of inferencing should prepare teachers not only to manipulate these variables, but also to help students themselves achieve conscious control over them. It is to be noted that histories of success or failure affect perceptions of the probability levels of a pay-off matrix. Further the actual interaction of an individual with successive pay-off matrices affects the kinds of consequences and probability levels of the subsequent pay-off matrices the individual will encounter. In specific terms, a successful inferencer in foreign languages will tend to practice his art frequently. Such an individual is not likely to be lead astray in an entire passage by an erroneous inference he makes early in the passage -- he will know how to correct it. The reverse is likely to be true for an unsuccessful inferencer.

We have noted valid inferences must be correct in respect to the canons of logic. But what of rational inferences that are arrived at by the most valid, but not necessarily perfectly valid, procedures that are possible in a probabilistic universe that demands rapid action? We shall call these reasonable inferences. They are less probably correct than valid inferences, but it may be rational to accept their reduced probability.

In language study in the last analysis it is (a) the nature of the target language, (b) its relation to the background language (or other languages known to the learner) and (c) the particular linguistic material under consideration that determine the possibility for making inferences. Sources of cues for making inferences may be divided into three categories. We will call them intra-lingual, inter-lingual and extra-lingual.

Intra-lingual cues are those that are supplied by the target language. There must be at least some knowledge of the target language if they are to be used at all. Under this heading are to be included all inferences that may be made from the morphological regularity of the language and all inferences as to the morphological and syntactic structures of the language.

Next there are inferences as to meaning that might occur as a consequence of certain grammatical manipulations of morphemes that have semantic significance, such as derivational affixes. In English, for example, there are instances in which suffixing upon a common stem may convey the notion of an action, an agent, or an abstraction (e.g. $\sqrt{\text{operate--}}$; *operate*; *operator*; *operation*). Knowledge of the suffixing narrows the semantic field in respect to the notions of action, agent or abstraction and knowledge of the stem narrows it in respect to the specific action, etc. Knowledge of both frequently makes possible inferencing of what might otherwise seem to be a completely novel lexical item. Agglutinating languages and languages that make regular use of stems (such as the Semitic languages) are particularly well suited to this type of inferencing.

In instances where a stem alone is the only cue, the cue may reduce the semantic field somewhat and *increase* the probability of making a correct inference, but sometimes only the most exquisite ingenuity would be helpful. In these instances, it is possible that the inferencing would have the effect only of focusing attention in the direction of the semantic field and supplying valuable mnemonics for retaining the lexical item. A student of English who knows the stem $\sqrt{\text{man --}}$ is "hand" but does not know $\sqrt{\text{face --}}$ is "make" may be able to arrive at the meaning of "manual" but would be very unlikely to infer "manufacture." Yet once he learned the etymology "to make by hand" it might serve as an amusing and powerful mnemonic. The reader is invited to examine the following examples from Turkish and to consider the degree to which the striking character of the items would help him fix them in memory. In Turkish *yol* means "road" while *yollamak* is the verb "to send" and *gun* means "day" while *gunes* means "sun."

Another source of intra-lingual cues that increase only the probability of making correct inferences are grammatical markers of gender or of "animate" and "inanimate" nouns which occur in some languages. There is much justified argument holding that in many instances these are purely grammatical phenomena and are not at all semantic. Historical linguistics remains somewhat puzzled as to the functions of these markers. But it is reasonable to suppose that once these markers did correspond to semantic categories and that they were deprived of their regularities and reliabilities by the vicissitudes of linguistic change. These markers retain potential usefulness for making reasonable, if highly probabilistic, inferences. Thus while purported attributes of masculinity or feminity may not help us decide whether we ought to put le or la before table in French there is no chanciness in respect to nouns denoting persons. If a context supplies cues that kin are spoken about, the marker la preceding soeur quite definitely indicates a female relative and reduces the universe of possible meanings.

A relatively unexplored domain of intra-lingual cues are the phenomena associated with phonesthemes. Phonesthemes are (usually) consonant clusters that seem to be related to a semantic category. For example, there are indications that English words containing initial /sl/ fall into 14 meaning categories some of which are "weakness," "sloppiness," "slowness," etc. (Carton, 1956). Other phonesthemes in English seem to be /sp/ for radiating expulsions from a limited source, /fl/ which seems to be related to flowing motions, /bl/ which seems to be related to explosions. The analysis of phonesthemes to date has been conducted on a purely linguistic basis, and beyond some conjecture (Skinner, 1957), the related psychological phenomena are unknown. It is reasonable to entertain the hypothesis that these meaning categories associated with the phonetic features of words hasten the acquisition of meaning through unconscious mental processes or that meanings are affected by the phonesthematic phenomena. An exploration that may be fruitful in its value for inferencing would be an exploration of whether phonesthemes may be used to reduce the universe of possible meanings of words and to suggest probable meanings. This notion unfortunately could not be explored in the present study.

The category of inter-lingual cues includes all the possible derivations that may be made on the basis of loans between languages, the occurrence of cognates, and the occurrence of regularities of transformation from one language to another. Thus, it is conceivable that a few minutes of instruction about Grimm's law, which describes the correspondences of certain consonants in High Germanic languages with other consonants in Low Germanic languages may be more useful in helping an English speaking student of German understand the language than many hours of vocabulary memorization. The use of inter-lingual cues in inferencing presupposes, of course, that the target language and the source language (or some other language known to the learner) are historically related or that there has been cultural contact between the peoples speaking each language. It may be added that the danger of being lead astray by "false friends" (e.g. French blesser means "to wound" not "to bless") is minimized when other factors, such as context, adequate re-scanning of the environment, and other validating procedures are invoked. Further, it seems, even at first glance, that the number of false friends in languages related to English is relatively small and that the probability of being lead astray by such instances is much smaller than the probability of being helped by true friends. Of course, this assertion is to be validated by statistical analysis of the linguistic phenomena in question.

Part of the usefulness of extra-lingual or contextual cues in linguistic inferencing is attributable to the fact that a major function of language is to represent objects and events of the "real" world. More simply, we are almost always talking about something. The fact that all of us know something about the regularities of the objective world we talk about makes it possible for us to predict many occurrences in it. If we can sometimes predict the occurrences of the real world, on the basis of preceding occurrences, it follows that we can sometimes predict the words that we use to represent these occurrences. The "paragraph cues" described earlier in connection with cloze procedure are extra-lingual or contextual cues.

Close study of the kinds of cues a student of a foreign language can use must be a central part of any project designed to introduce inferencing into foreign language education. The category system suggested here may prove useful in such a study.

Inferencing and Objectives of Foreign Language Education

This project is not intended to generate the substitution of inferencing for all methods of foreign language instruction. Rather, it is argued that investigation is justified to determine the extent to which any procedure for teaching a foreign language can be improved by giving some attention to the inference making process.

It is not anticipated that attention to inference making will cause a very profound alteration of the goals of foreign language teaching in our schools. The currently accepted major goals of foreign language study (oral comprehension, speaking, reading and writing) may be facilitated by inferencing. Investigation of inferencing may be considered as an attempt to improve the technique for achieving these goals.

Yet attention to inferencing in the process of teaching foreign languages may contribute modestly to the extension of the goals of foreign language teaching. First there is the fact that experience with inferencing should prepare the student to continue to learn words and structures of a language as he attempts to use it. Thus the objective of imparting to the student the ability to continue to learn the language studied may be added to the list of educational objectives for foreign language teaching. This addition may warrant a reappraisal and modification of the level of proficiency any course sets out to achieve with its students.

Next, training for inferencing may be expected to prepare the student to cope with the phenomena of language in general. Thus a new objective of foreign language education may be the increase of aptitude with which a student enters into future language learning situations. Innovations in method which might make this objective feasible are much to be desired in the context of the modern world.

Finally attention to inferencing in foreign language teaching would constitute actual training in the well-directed and self-conscious use of one of the most salient mental processes. There is no predicting at present how such training may extend the intellectual capacities of a student. There is, however, certainly every justification for attempting this.

The inclusion of inferencing among the objectives of foreign language study would constitute a step in the direction of emphasis upon cognitive processes and strategies of inquiry. This seems to be the general direction of most of the present day curricular areas.

Chapter II

OBJECTIVES

The Inference Project was originally conceived to test the hypothesis that training students who have not completely mastered a given foreign language to make effective inferences will improve their listening and reading comprehension in that language. Further, it was hypothesized that learning by inference will promote more learning and longer retention than the exclusive use of drill methods. Finally, some "transfer" effects to other curriculum areas were anticipated if the training to make inferences in the foreign language setting proved effective.

The test of the hypotheses depended upon the validity of the assumption that the training procedure used for helping students make inferences was an effective one, and that the behavior elicited by the procedure was the behavior that was anticipated to produce a salutary effect on language comprehension and learning. The test of the adequacy of this assumption became, therefore, a necessary pre-condition for achieving the original, basic objectives.

The assumptions, in turn, implied the need for a clear understanding of the inference process in the foreign language learning situation, training procedures and materials for developing inference behavior in pupils, measures of inference behavior that would make possible the assessment of the training procedures, and measures of pupil achievement in foreign language learning. In last analysis, the development or selection of these became the objectives of the project reported upon here.

In the actual operation of the project, these objectives were divided into the three problem areas enumerated in the preface. In specific terms they implied:

(a) specification of the behavior desired;

(b) a program to train teachers to elicit the behavior;

(c) an observation technique to assess the quantity and quality of inference elicitation;

(d) an analysis of French as a setting in which American pupils might make inferences;

(e) specific lessons showing how inferences can be made in foreign languages in general and in French specifically;

(f) a general measure of inference behavior to make possible an assessment as to the effectiveness of the instruction and to relate inference behavior to foreign language achievement;

(g) measurement of foreign language achievement.

Chapter III

A LOG OF THE INFERENCE PROJECT

Phase I of the Inference Project began in September 1963 at the New York University School of Education. Staff recruitment was initiated immediately, but a full complement of authorized personnel was never assembled during the entire first phase, which terminated in September, 1964.

October, November and December were partially devoted to visiting schools in an effort to enlist the cooperation of conveniently located, congenial research settings. Some twenty schools were visited and the search involved many hours of direct observation in classrooms. These observations, in turn, emphasized the need for working with a systematic scheme for analysing teacher behavior in the foreign language classroom. A simple tentative scheme was developed early in the project, but was continually revised and enlarged throughout the remainder of the project.

By the end of the Third Quarter of Phase I (March, 1964) the two schools that were to serve as experimental settings were identified. It was originally anticipated that each school would provide three teachers but only two teachers from each school were able to commit themselves to all the demands of the project. (One of the remaining four left teaching on maternity leave in the middle of Phase II). The two schools, Rockville Center Junior High School and Scarsdale Junior High School were located in middle class New York City suburbs. Both schools belonged to systems that were characterized by positive attitudes toward educational research and innovation and both had vigorous and alert foreign language departments. It may be assumed that the administrative problems of introducing innovations and research were minimized in these settings and that the project was only very slightly, if at all, burdened with the kinds of difficulties that on occasion do arise between research organizations and schools.

By the end of the third quarter of the first phase (June, 1964) the project was dividing its energies to cope with its three problem areas; that is, the areas enumerated in the preface.

a) A study of French as an ecology in which American students might make inferences was conceived. Questions of the probabilistic nature of phonetic and semantic correspondences between English and French were raised. Exploration of the question of the relative reliability of certain transformation keys was initiated. Analyses of various types of "inter-lingual" cues were underway.

b) At the same time, tape recordings of class sessions in the rooms of the teachers scheduled to teach inferencing in the next year were being collected. The teachers had started to meet with the project staff at workshop meetings.

c) The "pupil area" was represented by activity in preparing special inference lessons, testing of students with standard achievement tests to collect "base-line" data, and the development and administration of tests of inference making.

The Final Quarter of Phase I, June 10 to September 9, 1965, was devoted mainly to data processing. A large portion of the tape recordings made in the classrooms were transcribed and the protocols were duplicated. The test data were scored and analysed.

The two weeks prior to the beginning of the school semester were devoted to an intensive workshop with teachers. The major portion of consultation with scholars not on the staff of the project occurred during this workshop period.

Phase II of the project was designed to stage an actual try-out of the "inference method" in school settings. The project director had left New York University and had accepted a position in the Office of Research and Evaluation of the Division of Teacher Education at The City University of New York. The Office of Education contract for Phase II was, therefore, concluded with The City University of New York. In Phase II there were some problems of turn-over in the staff members who left for various personal and professional reasons, which, on occasion, resulted in the loss of months of work on certain sub-projects or in their incompletion. Nevertheless, the operation of the Office of Research and Evaluation provided the project with the full complement of authorized personnel -- and more -- through every day of its duration.

By November, 1965, a month behind schedule, control groups that seemed optimally suited for the project were identified and recruited. Pretesting for both control and experimental group was almost completed by the end of December. Some defects in the pretesting proved irreparable. Recordings of classroom procedures were underway and close work with the teachers in the experimental groups had begun using the recordings as a basis for modifying teaching procedures and increasing the frequency "inference elicitations." The project staff had begun to administer a series of lessons on the nature of inference and the possibilities for making inferences in French. At the same time, analyses of some of the affinities between English and French were being continued in preparation for future lessons.

By the second quarter of Phase II, January 1 to April 1, 1965, indications accumulated that it would not be possible to complete all the details of the research design. The anticipation that there would be pre-training and post-training data for a test of *Willingness to Make Inferences* was defeated. In the attempt to build this test as a battery of already available tests, however, an original and very promising item type suggested itself. The *Visual Inference Test* made a very large claim on the energies of the project from the moment of its conception to the conclusion of the project. The possibilities and the conception of the test continue to expand. (It will, doubtless, demand a large portion of the project director's research energies in the future.)[2]

The study of the probabilistic nature of the correspondences between French and English, by this time designated as "The study of 'inter-lingual' cues," had also expanded in its conception in the second quarter. Consideration was given to adopting this study to computerized procedures but it later became obvious that this was beyond the scope of a project with so many other commitments. A less ambitious study was formulated to provide some material that might be used in the classroom while some consideration and exploratory efforts were devoted to merely *formulating* the problem for a computerized solution.

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2. The original Picture Guessing Test that was first considered to be a possible basis for an inference test was discarded because it was comparatively uninformative and because of the skewed and unreliable data it yielded.

The scheme for analysing the instructional behavior had expanded into a "taxonomy of teacher moves." By this time, an "open systems" model of the classroom had been adopted and a lengthy work paper was drafted. The press of the schedule for administering the project in the schools prevented final editing of this paper while the school program was in progress. A condensed version of this paper appears in this report for the first time in duplicated form.

Work with teachers and the administration of special lessons continued during the period. Despite the expansion of the "within-office" projects during the period, the preparations and procurement of teaching and testing materials for use in the classroom continued at pace adequate to meet the demands of the schedule.

The Third Quarter of Phase II, April to July, 1965, saw the project mainly concerned with data collection for the evaluation of method. The "field," i.e., the classroom aspects of the project, demanded a hectic pace of testing and other aspects of data collection. Because of this, and because of two instances of staff turnover, some of the "within-office" sub-projects were suspended. Some of these suspended sub-projects, such as a detailed review of psychological literature on inference, were not resumed by the expiration date of the contract. The study of inter-lingual cues was truncated.

The Fourth Quarter of the Second Phase, July to October, encompassed the major portion of the summer vacations of the staff. The data collected in the spring were inventoried and some processing was accomplished, particularly the transcription and duplication of some, but not all, classroom protocols. A number of lacunae in the data necessary for final evaluation were discovered.

Resumption of activities in the fall, that is the fifth quarter of Phase II, found the project confronted with additional testing and data collection in an effort to patch the losses in data encountered in the preceding spring. The remainder of that quarter and the three-month extension period granted by the Office of Education were devoted to data analysis, the preparation of this report, and to dissemination activities.

Chapter IV

INFERENCE IN FOREIGN LANGUAGE STUDY - THE TASK FOR THE TEACHER

This chapter is devoted to describing the skill and knowledge of inferencing that teachers were expected to impart to pupils. It is concerned with what pupils were expected to learn and is labeled "task for teachers" because in this project teachers were the agents for achieving its objectives. It is to be noted that while the essentials of the following statement were formulated early in the project, the present form is the most recent version and embodies modifications generated by experience and analysis.

The Inference Process

Let us consider a student of French in his second year scanning a sentence in French. He proceeds from left to right if he is reading or he must wait for the words (more accurately, morphemes) to follow each other if he is listening. At any rate, at first the linguistic units are presented to him in a sequence predetermined by the "sender" of the sentence and the student has no choice in ordering them.

Let us assume that the first half dozen words are familiar to the student and that that rather mysterious process called "understanding" proceeds smoothly. Eventually, an unfamiliar word is encountered. There may be an instant in which the very fact of its unfamiliarity goes unnoticed. If the succeeding units continue to be familiar and the context is so redundant that the novel word actually adds no or little information, the unfamiliarity of the unit may remain unnoticed and comprehension will proceed as though _all_ the units were familiar.

This is the least effortful form of inferencing. Perhaps it is subliminal learning and not inferencing at all. It is known to occur because the experience of "understanding" a message despite the presence of unfamiliar signals is a common one. The questions as to how many exposures are required for learning an unfamiliar unit in such contexts, and how permanent is the retention of units learned in this way are interesting, but largely unanswered.

This "least effortful" or perhaps pre-conscious or unconscious form of inference seems to occur without any intention or effort to learn how to do it. Educational technology might exploit its occurrence and accelerate learning by frequently inserting novel linguistic units in contexts where they may be acquired in this manner. But in the present project, we were at a loss as to how we might teach any pupils how to use this process if they do not do it "naturally," as it were. It was felt that it would be instructive to pupils to point out the existence of this phenomena because awareness of it might give them more confidence in the inference process. Beyond such notice, this type of inferencing was omitted from further consideration in the project.

Returning to the encounter with the novel word, let us now assume that what Roger Brown (1958) calls a "sensation of derailment" occurs. The "click" of comprehension fails. The fact that the sentence contains an unfamiliar word seems to flash into consciousness and the unfamiliar word is identified. The student may now ask himself much more consciously than in the previous instance: what does the context suggest this word to mean? If he is listening, context will continue to accumulate, while he may be scanning his memory of preceding context. If he is reading, he may decide to read on for more context before returning to re-scan the preceding context.

In the auditory mode, there are temporal limitations which undoubtedly reduce the probability that successful inferencing will occur. The hearer is not only confronted with the accumulation of context at a rate which he cannot control, he must also race against the fact that much of the preceding context is being dumped from "short-term memory" into oblivion rather than into "long-term memory."

The pace for the visual mode can be infinitely more leisurely. The text itself can serve the role of memory. The reader can choose to look ahead or to preceding context in any sequence that seems suitable. He can rearrange the sequence of signals with much less burden on his memory.

In addition to context, the student may examine the word itself. In auditory inferencing of French, he may attempt to visualise the word as it would appear in print because similarities between French and English are often more salient in their spelling than in their sound. Finally, mere free association to the novel word may prove helpful. The kinds of cues that may be used and the principles of inter-lingual correspondence are discussed elsewhere in this report.

Once a notion as to what the word may mean is formed, the question arises as to whether the notion is a correct one. Several notions may occur to the student and only one, or perhaps none, of these may be correct. The task now becomes one of scanning the context and the internal structure of the word for confirming evidence. For example, two notions may be generated by the context, but a close look at the word itself and perhaps some recall of the relations between English and French (see Chapters I and VIII) may indicate that one of these notions is more probable than another. As more notions are suggested, it would seem that the probability that the correct one is _among_ them increases, but the probability of selecting _which one_ is the correct one remains the same as when fewer notions suggest themselves.

It is obvious that contexts and internal characteristics of the word will vary in the amount of confirming information they supply. This factor, therefore, raises the question as to how certain the student may be about the inference he has produced. The degree of certainty will effect his behavior in a number of ways. If he feels very tentative about his inference he may continue to scan the context for confirming cues, perhaps continuing the reading with an intention of returning to the point where the inference was made after considerably more information is accumulated. In some instances the search for confirmation may broaden and finally result in consultation with the dictionary or the teacher. The range of exploration and energy exerted in the search for confirmation should be proporational to the relevance of the unknown word to the text being scanned. A novel word in a parenthetic phrase is less likely to be necessary for the comprehension of a passage than a substantive word in a title. Words that re-appear frequently in a passage, but which cannot be "inferenced" are more justifiably looked up than a word that occurs but once. The frequently appearing words are keys to further inferencing.

The certainty about an inference is effected not only by the number of cues available for confirmation but also by the degree to which the cues agree with each other in the formulation of an integrated context. The degree of certainty a student feels should not only effect the range of his search for further cues but should also effect the degree to which he is prepared to change or modify an inference on the basis of subsequent information.

Tasks for the Teacher

As described above, the inference process is not a single psychological function that can be practiced, nor is inference the learning of subject matter than can be imparted through one or another teaching-learning procedure. Inferencing is what might be called an "educational fiction." It is an agglomeration of behaviors into a general strategy for coping with a specific kind of problem that is believed to be frequently encountered. The various behaviors require development, and in any individual the level of development of one may not be up to the level of development of another. And all the aspects of inferencing -- scanning, confirmation and testing for adequacy, assessment of probability that the inference is correct (i.e., certainty assessments), and re-adjustment to later information -- require psychological development.

re-adjustment to later information -- require psychological development.

The teacher must be prepared to diagnose the development of each student as closely as possible, so that he can emphasize training in the proper aspects and know when the student is ready to make inferences indepently. Chapter IX deals with the development of a tool to aid in diagnosis. More often than not, instruction should be individualized.

Since inferencing is a process and a strategy, it is important to point out that the assessment of good inferencing cannot be made against the single criterion of whether the responses made by pupils were right or wrong. Good inferencing may yield incorrect responses and poor inferencing may yield correct responses. Not only is the teacher confrunted with adjusting to this complication in his public system of rewards and punishments for students, he must also assess his success in training students in terms of their competence with the process rather than in terms of their correctness. If teaching is truly individualized and diagnosis is accurate, a response considered good for one pupil may be considered poor for another.

The major role of the teacher in training students to make inferences is to serve as a guide or manager of the process. He must encourage appropriate scanning for cues. In some instances it is appropriate to delay scanning and in other circumstances it is essential that scanning occur promptly. Sometimes it is more appropriate to scan forward in a text (i.e., later in time or further to the right and down the page) than to scan backwards.[3]

Next the teacher must develop in students a sense of the importance of seeking confirming cues and testing for the validity of correct inferences. Experience should be provided of instances in which contradictory cues lead to modifications of inferences.

Probably the most important factor in inference training is the appropriateness of the sense of certainty to the inference that is made. A student who learns to be tentative about wrong inferences is to be considered to be more advanced than a student who has merely learned to make correct inferences.

In guiding the inference process, it is likely that at some point in the training each aspect will need to be overtly discussed. Selection of aspects of the process to be discussed will depend on the diagnosis of the student and the particular inference problem at hand. The teacher's questions will be directed to process rather than content. What are you doing (or should you be doing) now? What are you thinking of now? What's coming into your mind? What are you going to do to check that idea?

Probably the most taxing aspect for the teacher in training students to make inferences is the maintenance of a conducive classroom climate. Inference requires free, uninhibited mental production and will not thrive in a punitive atmosphere. On the other hand, it requires the development of stringent self-criticism and self-evaluation on the part of students which will not occur in a classroom where "anything goes."

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[3] If the preceding cues had provided adequate information they would have already suggested a notion of the meaning of the word. Sometimes a notion may have been suggested and the forward scanning occurs mainly for confirmation and testing. On the other hand, when preceding context was already full of unresolved novel signals and the comprehension of the preceding text is uncertain and tentative, it is wise to scan preceding text and to avoid the danger of allowing subsequent context to lead the student astray.

In guiding the inference process it is well for the teacher to set up situations in which inferences of various levels of certainty can be made. Sometimes there should be an abundance of cues and easy confirmation. At other times, the cues should be rare and contradictory. The judicious "planting" of cues adjusted to the level of achievement in the curriculum is thus necessary. Such planting requires very close analysis of the curriculum and accurate assessment of the knowledge of pupils. This is not always entirely possible and occasionally requires some adroit and tactful readjustments on the part of the teacher, as pupils disappoint some expectations and provide surprises in connection with others. The use of free associations are least subject to prediction. Knowledge from many sources plays a role here. A teacher who was about to explain what les Saracens meant was interrupted by a pupil who blurted out "Arabs" remembering the term from his social studies.

The fact that cues may be planted and associates come from the unknown stores of the memories of pupils, brings attention to an error in inference elicitation which teachers might find difficult to resist. It is a procedure labeled "overloading" in the project and could be observed in any class of untrained teachers where they had an inkling that the observer was looking for "inference."

Overloading would occur as follows. A teacher giving a little talk on reading a story would pause and repeat with an interrogative intonation a word he knew to be novel. Students would focus their attention on the word, but the cues for the inference would be absent. The teacher would then proceed to provide an abundance of cues, frequently including pantomime, with the express purpose of merely "not telling" what the new word meant. Sometimes his own associations to the word would be suggested despite the fact that these originated from experience most of which was alien to the pupils. A single pupil subjected to this procedure in the presence of the class ("individualization") would frequently become overwrought and stab desperately for what he thought the teacher wanted, losing track of the nature of the text and cues that were contradictory to his inference. In "whole class" teaching the procedure would degenerate into a guessing game, frequently found to be quite enjoyable by students. The evaluative components of the inference process would be entirely lost and scanning for cues would give way to the expectation that the teacher would supply all the relevant cues and only cues that were relevant.

While defective as inference elicitation in many ways, the guessing game procedure seems to be useful as an initial step in inference training merely to communicate the possibility of using cues in the foreign language in a pleasant way and to reduce the impulse to ask the meaning of an unknown word or to consult the dictionary.

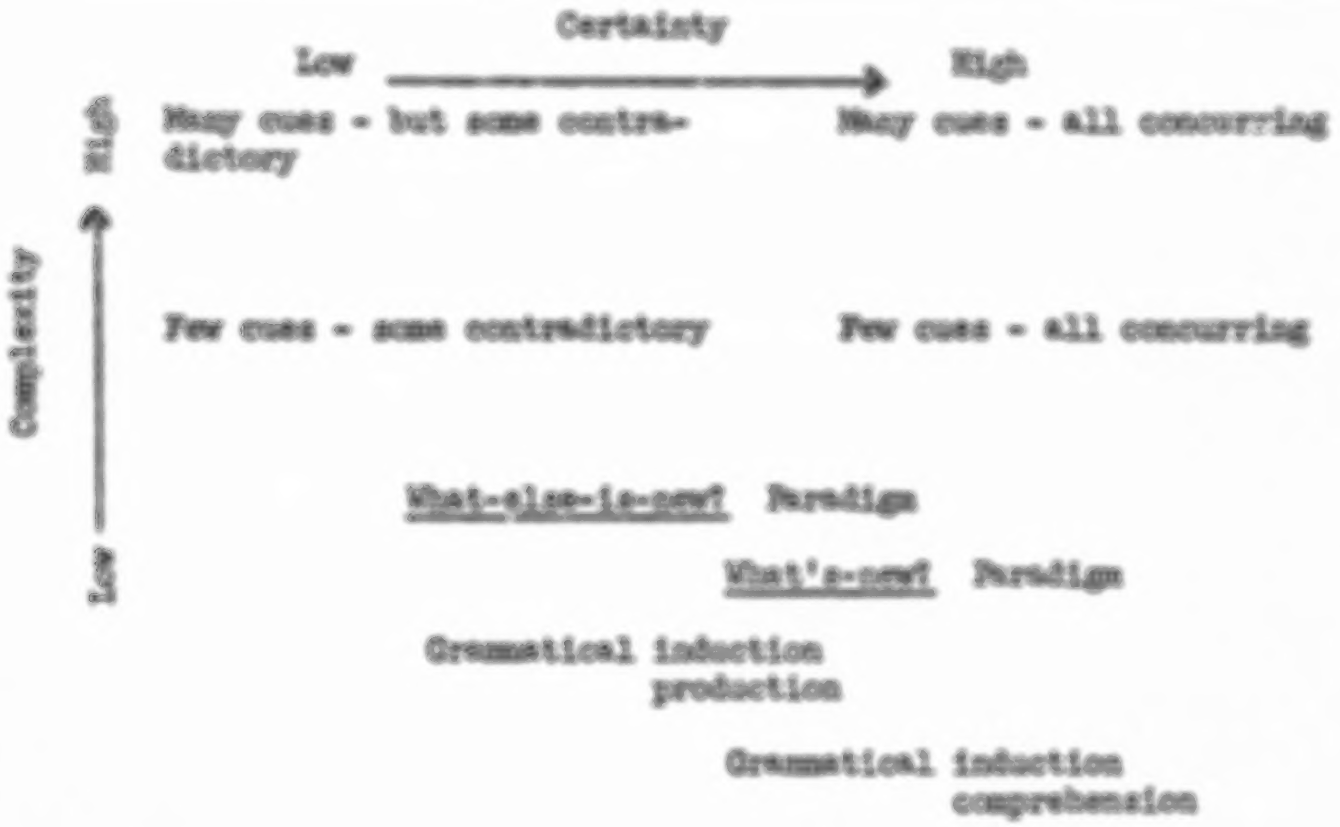
Implicit in the preceding discussion lies the fact that several kinds or types of inferencing can be distinguished. These types can be arranged on a continuum in respect to the certainty they generate and the complexity they involve. In this analysis, high complexity is implied by a large variety of different kinds of cues while low complexity is implied either by few cues or many cues of the same kind. Figure 1 illustrates a kind of map for the ensuring discussion in which complexity and certainty serve as guide marks.

High complexity and high certainty would occur when there are many different kinds of cues and they all concur in suggesting a single inference. For example, the preceding and succeeding context may be concerned with a single topic and the form class of the word, its morphological markers and the possible English cognate all suggest the same topic. Contradictoriness among the cues, however, reduces certainty.

High complexity with low certainty would occur when the concept suggested by one part of the context does not agree with the concept suggested by another part, or where the features of the word itself do not agree with the concept or are totally uninformative. Reduction in the number of cues, however, reduces complexity.

Figure 1

An Arrangement of Inference Situations


Certainty
Low
High
High
Many cues - but some contradictory
Many cues - all concurring
Complexity
Few cues - some contradictory
Few cues - all concurring
What-else-is-new? Paradigm
What's-new? Paradigm
Grammatical induction production
Grammatical induction comprehension
Low

A combination of very low complexity and high certainty is generated by what was called the "What's-new?" paradigm.(see Chapters V, and VII). In this paradigm a single novel linguistic element is introduced with a single referent. "This is a hat," with appropriate pointing is the simplest example. If the pointing is clear, certainty is so high that this can hardly be called inference. Slightly more subtle is the introduction of novel elements one at a time, onto already known elements. The word umbrella may be revealed to a student who knows hat, man and the remaining function words by pointing to an appropriate individual saying: "That man with the hat has an umbrella." Although the algebra is so straightforward here that one hesitates to call this inference, probabilities occur in the possibility the student may fortuitously attend to the man's ears rather than his umbrella and may thus make an error.

A slightly more complex and somewhat less certain inference occurs in the "*what-else-is-new?*" paradigm. This paradigm confronts the student with more than one novel linguistic element and more than one novel referent. This paradigm may require tentative inferencing that awaits either later confirmation, or appropriate inquiry such as a linguist might perform in field-work, or very subtle and careful analysis of the materials. With *umbrella* and *spats* as unknown elements, consider the problem of a pupil being told: "That man with the hat has an umbrella and spats." The plural marker on *spats* and the singular marker on umbrella would probably make the problem easy, but certainly is absolute since in English (as the target language)-/s/ is not always a plural marker and certain collectives or sets are not always designated as plurals. Certainty would be assured only after an instance of a man without *either* umbrella or spats.

The induction of grammatical regularities from examples is an instance of low complexity and high certainty. This frequently used and well known "teaching by discovery" provides the same *kind* of unknown cues throughout a large number of examples. All the relevant cues and only relevant and concurring cues are available. The student is required to state the rule or provide a new example. Uncertainty occurs not in the inference process but in variations in the abilities of students to induce the rule. Even when the rule contains some complicated contingencies (e.g., "if speaking to a peer use *tu* and add */-s/* to the stem, if speaking to a superior use *vous* and add */-ez/* in the present tense but in the past tense..."),the elements are usually made available in this procedure and the problem is algebraically soluble with certainty if the student will merely follow the rules. It is to be noted that while the induction of rules from examples generates certainty for the corpus presented, there is considerable chanciness in production. As noted in Chapter I, the somewhat irregular character of language may generate an utterance such as "i falled out of bed."

While grammatical induction was originally considered an appropriate component of the inference process (see Chapter I), and while teachers in the project frequently experimented with inductive and deductive procedures, hindsight indicates that this approach might have been omitted from the project as contributing very little to the development of abilities to cope with probabilities or to conduct inquiry for learning language. A more appropriate concern was instruction in how to ask questions or scan texts in order to ascertain linguistic regularities. This concern was but slightly developed. Nevertheless it brought some of the methodology of linguistic fieldwork into the junior high school classroom.

Chapter V

THE PREPARATION OF TEACHERS

"Discimus Docendo"

In general the "Inference Project" had as its objective the testing of a change in curricular emphasis to be effected in the classroom. A necessary condition for research with this kind of objective is the successful modification of the usual conduct of teachers. This chapter is devoted to a discussion of the role played by teachers on the "Inference Project."

In this chapter as in the preceding one, a distinction is to be maintained between what actually occurred on the project and what might or ought to have occurred. Experience has suggested additional and alternative strategies or procedures that might have contributed to greater success than was achieved. The value of this report would, no doubt, be diminished if the products of this hindsight were omitted. But a description of what "ought to have been" would not only be a violation of the purpose of this research report, it would also constitute an injustice in proper evaluation of the concepts underlying the project.

Objectives and Procedures in Teacher-Training

There were three categories of objectives in the preparation of teachers for the Inference Project. The first was the orientation toward the concepts of the project and its educational philosophy. The creative energies of the participating teachers were enlisted by this orientation. Second, there was the development of competence in the inference process itself. For teachers this entailed both understanding the definition of the process and skill gained through experience in using it. Finally there was the development of skill in teaching inference. This consists of: a) providing instances in which it could occur; b) the preparation of detailed materials showing the possibilities for inferencing in French; c) providing a climate conducive to inference; d) recognizing acceptable and unacceptable inference responses; and e) understanding the development of the skill as it occurred in pupils. In general, the workshop sought to develop a technology of inference elicitation including procedures such as those described in the preceding chapter and specific applications to French.

The training of teachers consisted of two kinds of procedures: workshops and analyses of each teacher's classroom behavior. In the workshops, groups of teachers met with other project staff members or with consultants for instruction or discussion. Analyses of classroom behavior were conducted on an individual basis at sessions at which only a single participating teacher and a project staff member were present. The workshop sessions covered all three objectives of the teacher training and this chapter is devoted mainly to a description of the curriculum of these meetings. The individual sessions, on the other hand, were directed mainly toward improving the participating teacher's skills in the technology of inference elicitation and in suggesting concrete materials to be used in the classroom.

In the individual sessions an attempt was made to establish a pattern of meeting with a teacher shortly after a recording was prepared in his classroom. The recording was analyzed in the terms of the scheme for analyzing teacher behavior to be discussed in the succeeding chapter. The purpose was to develop skill in recognizing good inferencing on the part of pupils in a setting at which the teacher could attend to pupil behavior without the need for rapidly planning his next move as the would have to in the actual classroom situation. It was anticipated that the procedure would help the teacher develop a better understanding of the effects on his pupils of his behavior than he possibly could under the duress of the schedule of a classroom lesson. Ultimately, it was hoped that these sessions would lead to the development of skill in planning the best kinds of inference eliciting moves.

Unfortunately, the wish was not father to the deed in the case of the individual sessions with teachers. The sessions occurred with much less frequency than was desired. The scheme for analyzing teacher behavior was not adequately completed for extensive use in the early phases of the try-out of the inference method. The entire project staff had much to learn about recognizing good inferencing. A tape recording per se is an unwieldy device for frequent re-examinations of the same event. Typed transcriptions would have been infinitely preferable. There was no provision, however, for the continuous services of a bi-lingual typist who would prepare protocols rapidly on a routine basis for use in individual sessions with teachers.

Despite the imperfections in the application of this procedure, the available feed-back indicates that the procedure might be quite useful in modifying teacher-behavior in classroom experimentation. The most significant and frequent problem one is likely to encounter is the expression by some teachers of their distaste for detailed analysis of their behavior. These teachers prefer to teach intuitively rather than by design. Sympathy, tact, and persuasiveness are required of the researcher working with them. When a preference for intuitive teaching cannot be overcome, it is probably preferable to exclude such teachers from research projects involving manipulations of classroom behavior.

Curriculum of the Workshops

A. Preliminary Meetings

During the Spring Semester of 1964, preliminary meetings of the workshops were held at each of the participating schools. These meetings concerned mainly with orientation and the development of a clear operationalization of the inference process. The sessions included discussions on: a) general linguistics; b) information theory and the notion of redundancy in language; c) the psychology of risk-taking; and d) a general expansion of the notions contained in an earlier version of a paper which appears in this report as Chapter I. In addition, the sessions included: a) some attempts at inferencing Italian and Spanish texts despite the meager backgrounds of any of the participants; b) some planning, by the teachers, of lessons suggested by the discussions that were attempted in this classrooms; and c) briefing on the research, the texts to be used and other administrative matters.

The teacher-experimenters were provided with a list of reading in linguistics and psycholinguistics which they requested for study during the summer of 1964. A considerable proportion of these materials were read by the beginning of the two-week workshop held at the end of the summer.

B. The Two-Week Summer Workshop

From August 24 through September 4, the teacher-experimenters met with the project staff and consultants in 10 full-day sessions held at New York University. According to the materials prepared:

> "The general and primary purpose of this workshop [was] to devise and develop methods, techniques, or procedures for teaching first and second year French by the 'method of inference.' The methods, techniques, procedures, or approaches developed [were] to be applied by the participants in the workshop in their French classes in the 1964-65 academic year. The energies of the workshop [were to] be directed not only toward developing general approaches, but also toward the preparation of specific model lessons to be taught early during the academic year.
>
> "A second objective of the workshop [was] to identify instances where alternative and apparently competitive procedures are proposed. It [was] our task to sketch procedures for assessing the superiority of one or another procedure.
>
> "A third objective [was] the identification of possible procedures that would require detailed development by specialist-technicians before they may be applied in the classroom. The workshop [was to] attempt to sketch the steps by which these procedures may be developed.
>
> "Fourth, the workshop [was to] attempt to devise procedures for assessing the effectiveness of all the approaches, procedures, and methods developed."

The agenda was organized to alternate plenary meetings, at which problems would be defined, and teaching materials criticized, with individual work-sessions, at which special classroom materials would be developed. The group, consisting of the four participating teacher-experimenters and the project staff, proved, however, to be too small for this pattern. It was abandoned. The teacher-experimenters felt that the opportunity to meet with each other and to discuss common problems was so useful that they were loath to give up time to working alone when their colleagues were available. Thus individual preparation occurred after workshop hours. There followed a summary of topics covered in the workshop and of the activities which occurred.

1. Educational Philosophy was the first issue to be dealt with. Professor Glen Heathers, Director of the New York University Project on the Dual Progress Plan, presented a keynote talk on self-directed learning. This theme had played an important role in the conception of the present project. Dr. Heather's talk, which defined several kinds of

self-directed learning, sketched the nature of the task for teachers the "process goals" implied. His lecture was followed by a discussion of the role of self-directed learning in foreign language education. It was noted that while this theme was gaining ascendancy and becoming the "trend" in other curricular areas such as science, mathematics, and social studies, the trend in foreign language study was in the opposite direction. Some of the reason why this was the case emerged from the discussion. The possibility of bringing self-direction to the objectives of foreign language education by exploiting the inference process became apparent.

2. Definition and Analysis of Inference

The definition and analysis of inference were developed essentially along the lines indicated in Chapter IV (less some refinements that were developed subsequently). At the inception of the workshop, a list of problems that would require analysis or experimentation was developed by the participants. The items listed below pertain to the analyses of inference that were included in the list.

(a) Inference in the auditory mode vs inference in the visual mode.

(b) Distinctions to be made between lexical and structural inference.

(c) "Pre-conscious" inference vs induction and deduction. (i.e., reasoning).

(d) Induction vs deduction.

(e) The role of probability in inferencing.

(f) The nature of the student and his relation to the inference process -- student typology in terms of age, level of knowledge, predispositions.

(g) Kinds of cues.

On the last day of the workshop the participants were asked to draw up a list of problems they felt still remained to be dealt with. That the workshop succeeded only in scratching the surface of the problems that were felt to be relevant may be seen from the fact that many of the new problems are redefinitions or reorganizations of the older ones, and from some of the overlap between the two lists. The fact that some of the items on the second list exhibit greater specificity is regarded as reflecting progress made in the workshop.

(a) Inferencing of structure: A systematic specification of approaches is required as is the development of some new teaching materials.

(b) A definition of the levels for which various inferencing techniques are to be devised and the determination of the best levels for using inferencing techniques.

(c) The development of techniques for presenting the idea of inferencing to students. The development of distinctions and similarities between language behavior and scientific inquiry.

(d) The role of feedback and the verification of inferences.

(e) The role of probability in inferencing.

(f) The nature of the choice of curricular items suited for inferencing. What lessons of the A/LM are best suited? Are other curricular to be considered?

3. The Canons of Good Inference

The attempt to analyse what constitutes good inference arrived at a slightly different resolution during the workshop sessions than the resolution presented in Chapter IV. At the workshop the matter resolved itself into two issues, a summary of which is reproduced here to provide an accurate account of the point of view of the teachers and project staff at the beginning of the treatment.

The first of the two issues was inferencing under probabilistic conditions that is in the context of the "pay-off" matrix. The analysis of this kind of inference requires data as to the probability of making a correct inference, which in turn is contingent upon characteristics of the text, of the language, and of the "inferencer." Relevant variables of the "inferencer" are expected to be his abilities to reason logically, his level of knowledge, and the stylistic and personality characteristics he has acquired for coping with risks.

The second issue was that of inferenceing under "absolute" rather than probabilistic conditions. Under these conditions probability and risk-taking do not play a role; only logic and information seem relevant.

The preparation and teaching of the canons of valid inference is expected to be simpler for the absolute context. It seems to be a matter of selecting some of the principles of logic that are applicable.

An attempt to develop systems for inferencing resulted in the formulation of the *What's-new?* and *What-else-is-new?* paradigms. The *What's-new?* paradigm is absolute. The *What-else-is-new?* paradigm is somewhat probabilistic. In the *What's-new?* paradigm a single lexical or structural item is introduced in the context of single change in the contextual field. For example, in a test attempting to teach English through pictures, a picture of a standing man may be accompanied by the sentence: "The man is standing." A subsequent picture of a man wearing a hat might be accompanied by the sentence: "The man with a hat is standing." The fact that a single change in the contextual field is accompanied by what is essentially a single appropriate change in the linguistic material presumably makes it rather easy for the student to ascertain how the new fact (i.e., the "hattedness" of the man) is to be handled lingustically.

In the *What-else-is-new?* paradigm, two or more changes may occur both in the contextual field and in the linguistic material. For example, the second picture in the series, such as the one referred to above, might show a man with both a hat and a cane accompanied by the sentence: "The man with the hat and cane is standing." Since two contextual features and two linguistic features are new to the student, he can only make probabilistic inferences. That is, "hat" can refer either to the thing on the man's head or the thing in the man's hand. The same is true for "cane."

Texts do not usually proceed in this manner. But a student who learns a language independently in an environment in which it is actually used, encounters problems of inferencing that will dwarf the *What-else-is-new?* paradigm in their complexity. The *What-else-is-new?* problems can be solved only with additional cues. The speaker of German, for example, may be willing to hazard that "hat" is a cognate of his German word "Hut." The student with less to go on might have to wait until either the word "hat" or "cane" occur in a different context or may ask an appropriate request for information such as: Show me the picture that goes with the sentence: "The man with the cane is standing."

It was noted that the algebra of single equations and simultaneous equations with two unknown is isomorphic respectively with the What's-new? and What-else-is-new? paradigms and the logic of their solution can be made rather straightforward. But the development of techniques for (a) using additional cues, (b) waiting for additional cues, or (c) asking for additional cues might prove to be extremely useful in preparing a student to make valid inferences and to become an independent student of language.

4. A Demonstration of Linguistic Field Methods

As noted previously it seemed that making valid inferences, in particular in respect to linguistic structure, is a process conceptually analogous to the preparation of grammars in linguistic field-investigations. The process is one of extracting regularities from bodies of text -- the linguistic raw data -- and/or hypothesizing regularities and testing for them by eliciting textual material from a naive expert speaker (NES) that would either confirm or disfirm hypothesized regularities. In Chapter IV, however, this process was labeled induction and distinguished from inference.

Dr. William Samarin, of Hartford Seminary Foundation, provided the workshop with a demonstration of linguistic field methods. Mr. Manuel Arenas, of the Wycliffe Bible Translators, who is a native of Mexico and an expert native speaker of Totonac, served as the informant. Dr. Samarin was requested to emphasize the elicitation of morphology and syntax in his presentation and to explain as much as he could of the methodology and rationale of his procedure.

The effect of the demonstration on the thinking and the attitudes of the participants in the workshop was immense. The exposure to a language which is completely foreign in its phonetics, lexicon, and structure emphasized the range of possible systems of human communication and revealed innumerable possibilities for using language study to extend flexibility in the thinking habits of pupils. Further, since both the linguistic investigator and the audience were completely ignorant of all features of the language under investigation, it provided a subjective experience -- perhaps similar to the experience of beginning students in the foreign language class -- of the dismay and possible excitement one encounters in trying to systematize a linguistic code. A sense of excitement pervaded the group as features of Totonac emerged before the group in mystery-story fashion.

Dr. Samarin emphasized the possibilities for systematically organizing the chaos for the naive student of an unknown code, yet he did not fail to indicate the role of intuition in this kind of investigation. Many of the essentials of systematically prepared curricular materials -- as opposed to raw linguistic data -- and their usefulness in learning a foreign language emerged from the demonstration. The issue of valid and invalid inferences was raised and the nature of tests for the validity of inferences became a matter of interest for the participants.

Many of the themes and procedures of the demonstration figured prominently in the discussions of classroom procedures that followed. The lesson on What's-new? and What-else-is-new? came closest to imparting one of the concepts of linguistic inquiry to students. Beyond this single lesson, the process of the curriculum seems to have interfered with communicating these concepts to students.

5. Direct Experience in Inferencing

A rather advanced reading passage in Dutch was presented to the group to provide a direct experience with inferencing. Mr. Sam Wallace, a research assistant on the project, proficient in Dutch, led the group through inference procedures for comprehending the passage. As the lesson proceeded, lexicon and structure were developed in a fashion somewhat similar to the linguistic field analysis the group had previously encountered. The most important difference was that the group was proceeding mainly from a text and allowing regularities to emerge, while Dr. Samarin's approach showed a preference for the hypothesis-testing strategy in linguistic analysis. In addition to the linguistic information that was acquired by an inquiry process, the exercise began to reveal some of the phonetic and lexical relations between Dutch and English and the participants quickly learned some of the more salient facts about the languages in the Low Germanic linguistic group. These facts, in turn, accelerated the inference process. The Project Director attempted to make some notes of the characteristics of the procedures used, but most of the inferencing seemed to occur covertly.

Shortly after the Dutch inferencing session, and again three days later on the last day of the workshop, a short test was administered asking for definitions of some words that had been encountered in the passage and of some words that had not been encountered. It was found that participants who knew some German performed better than those who knew none. Generally, however, correct English equivalents were supplied for well over 50% of all the words on the test list, which points to the power of the inference method in the case of closely allied languages as English and Dutch. The fact that some of the words had been encountered in context and were defined for the participants did not seem to affect their performance. Scores were approximately equal for new words and previously encountered ones. This finding goes hand in hand with the final observation that might be made concerning these exploratory data, namely that no significant differences were found between the first and second testings, which seems to imply that once the participants learned some of the inferencing techniques relevant to Dutch, memory did not play a role in their test performance.

6. Orientation on the Linguistic Sophistication of Students

The workshop group heard a report by Mrs. Magaud on the results of an exploratory study she had conducted at the junior high schools on the linguistic sophistication of the students. The findings of the study were considered relevant for helping the project staff prepare materials that were suited to the level of understanding of the pupils.

Mrs. Magaud had interviewed 22 pupils at Scarsdale Junior High School and at Rockville Center. The interviews were recorded on tape and were transcribed. Mrs. Magaud then conducted a qualitative analysis of a number of the responses and found a rather wide range of linguistic scophistication existed among the pupils. Many of the pupils seemed to have a good grasp of the arbitrary social contract that languages represent and are aware of the fact that linguistic structure is a matter of description rather than a matter of logically valid prescription. The word "rule" figured prominently in the responses. Some rather sophisticated comments on the relation between language and thought were obtained from the pupils. On the other hand, some pupils revealed rather naive and rigid notions on the nature of language. A section of the interview which involved using purely structural cues in a "nonsense" French sentence revealed that some of the pupils were able to use structural cues to the limit of their utility in making semantic inferences. There seemed to be some evidence, also, of allowing what Werner and Kaplan (Symbol Formation, 1963) call "physiognomic cues" and *ad hoc* assumptions about phonetic symbolism to mislead the less wary pupils. The level of sophistication of pupils observed in the interviews seemed to correspond well with their foreign language grades, and with their teacher's judgment of their language competence and aptitude. It was hoped that the data would help the staff's conception of what pupils must learn when using the inference method and provide many of the necessary caveats.

7. The Affinities Between English and French

Dr. Pauline Taylor of New York University was invited to make a presentation on the affinities between English and French. Her talk pointed to the many possibilities of making inferences about French lexical items from English lexicon. It also pointed to the limitations. Since her talk was couched in the historical philological tradition, the nature of the relation between English and French was clarified and the characteristics of important linguistic changes between the two languages specified. Dr. Taylor supplied an extensive bibliography. The material Dr. Taylor presented was "Table of Correspondences" -- which was projected for Phase II but not completed. It was felt that her presentation to the teacher-experimenters at the work-shop served well to orient teachers to possibilities of such a table and provided them with materials for use until the table is completely developed.

8. Taxonomy of Teacher Maneuvers

A preliminary formation of the taxonomy of teacher maneuvers was introduced to the teachers at the workshop meetings. Features in the taxonomy were discussed and some revisions were suggested. It was the consensus of the group that the examination of a protocol, while listening to the recording of the class, proved to be a very profitable experience. The analysis of these materials in the terms of the taxonomy gave the teacher-experimenters a very distinct sense of "knowing what they are doing." There was some concern expressed as to whether this kind of analysis would not inhibit a teacher's behavior in the classroom. One teacher-experimenter felt it would paralyze her if she had to analyze each move as she made it. It was suggested, therefore, that the taxonomy be used mainly as an analytic tool and as a device for directing teacher behavior in the classroom in a general way rather than as a device for controlling behavior completely.

9. The Preparation of Specific Lessons

In its final phase the workshop turned to the development of specific lessons by the teacher experimenters. Thus, Mrs. Betsy Schwarz undertook to develop a lesson where the correct us of "tu" and "vous" would be developed through the presentation of contextual examples. Mr. Raymond Binder prepared several versions or approaches to teaching the distinctions between masculine and feminine articles. Mrs. Molly Merchant developed procedures for teaching the passe compose. Miss Normandie Rioux demonstrated a lesson for presenting attribution. Suggestions for building lessons around the "informant-linguist" pattern were also entertained.

During their presentations, each of the lessons were subjected to analyses using the preliminary version of the teacher taxonomy that had been developed. Many very interesting characteristics of various types of strategies emerged. It became possible to analyze the nature of the learning task for the student when confronted with various strategies, and progress was made toward specifying where, when, and how students might be expected to make inferences. The general educational implications of the various kinds of inferencing became a frequent theme of the discussions.

10. The Preparation of a Reading Passage

An attempt was made to prepare a reading passage that might be used to present new lexicon by requiring pupils to make inferences about them. The geography of France was chosen as the topic and procedures were discussed to hint at the meanings of items -- e.g., the presentation of a map on a screen with a pointer designating areas. In attempting to write the passage, the workshop discovered certain characteristics of the style of expression that might be chosen first would affect the "inferenceability" of the text. Closer examination indicated that the type-token ratio (TTR) i.e., the ratio of the number of different words to the number of words in a text, was very likely to play a determining role. The most obvious characteristic affecting the "inferenceability" of a text was its redundancy, which was defined for the present purpose as the ratio of linguistic units to the number of concepts communicated. Some additional attempts were made to prepare passages of high and low TTR's and high and low redundancies that might be used for demonstration and practice with students. As the time of the workshop ran out, the task was turned over to the project staff for further development. It resulted in a slightly different approach to the problem and in materials labeled "context cues," which are described in Chapter VII.

The workshop concluded with a summarization of the areas that were covered. It was obvious that a considerable number of problems were dealt with and that a rather good understanding of the inference process had been achieved by all the participants. It was also obvious, however, that the work was incomplete. Much specific material for teaching purposes remained to be developed. Much specific practice in inference eliciting procedures was called for. Yet the date for the opening of school was imminent and teachers and staff were aware that the exploration of the inference method would consist only of a best "first approximation."

Chapter VI

THE BEHAVIOR OF TEACHERS IN THE CLASSROOM

To what extent did the training teachers received modify their usual behavior in the classroom? If no modification occurred, no change in the quality or nature of the achievement of students may be expected. Not infrequently, research projects attempting one or another educational innovation turn up with "no significant differences." Not infrequently the question is raised asking whether the desired innovations were, in fact, implemented. The collection of "implementation data" is a desirable and increasingly frequent occurrence in educational research.

This chapter is devoted to the attempt to collect implementation data for the Inference Project. It is concerned with a technique for observing and classifying the behavior of teachers in the foreign language classroom. It was hoped that the technique would help to determine: (a) whether teachers did, in fact, encourage students to make inferences; (b) whether they did this to a greater degree after training than before; and (c) if new teaching behaviors were observed, what old behaviors were abandoned in favor of encouraging inference making.

The development of the technique involved the investigators in an analysis of how the classroom functions to promote learning, and in an inventory of the total array of a teacher's activities. That is to say, more general issues had to be settled before the specific ones could be attacked. As a consequence, the technique under development seemed to have promise for more general uses than the specific purposes required by the project. The expansion of possibilities seemed to warrant the expansion of the scope of the technique. The technique seems to promise to be useful in: (a) projects where other kinds of manipulations by teachers are of interest; (b) tests of hypotheses of the relations between certain types of teacher behavior and aspects of pupil achievement; (c) training and re-training of teachers; and (d) objective evaluations of teacher behavior according to specifiable criteria.

It should be pointed out at the outset that the attempt to obtain satisfactory implementation data was not totally successful. The development of the technique together with the quantification of adequately large samples of teacher behavior according to the technique proved to be a formidable task for the resources of the project. Perhaps this technical difficulty is a fatal flaw in the technique or perhaps the problem is merely one of acquiring adequate experience and the streamlining of procedures. At any rate, the investigators have had to content themselves with reporting "general observations" based on the technique rather than the detailed, precise quantifications that had been hoped for. Yet, without the development of the technique, even the general observations could not have been made with the same certainty or would have been entirely lacking.

Background: The "Open Systems" Model

A detailed review of the development of classroom observation schedules is not appropriate to this report. Current activities in this field are adequately covered by Medley and Rabinowitz (1963) and Biddle and Ellena (1964).

A description of the model upon which the present schedule is based is appropriate.

In general, an open systems model may be schematized as containing four essential components. There is (a) the "input," (b) the system itself, (c) the "output," and finally, there is (d) a "feedback loop" where information or materials are picked up from part of the output and returned to the input. We consider a classroom as an open system having the purpose or objective of training students.

Untutored students, students who do not have certain skills or knowledge, are entered at the input and processed by the system. After training is complete they are emitted by the system, ostensibly as competent and trained individuals.

The system must also have an input of both operations and materials by which the students are trained. In the present schematization, the objectives of the training are considered one component of the input, the curriculum is considered a second component, and teacher behavior is considered a third component. These three components of

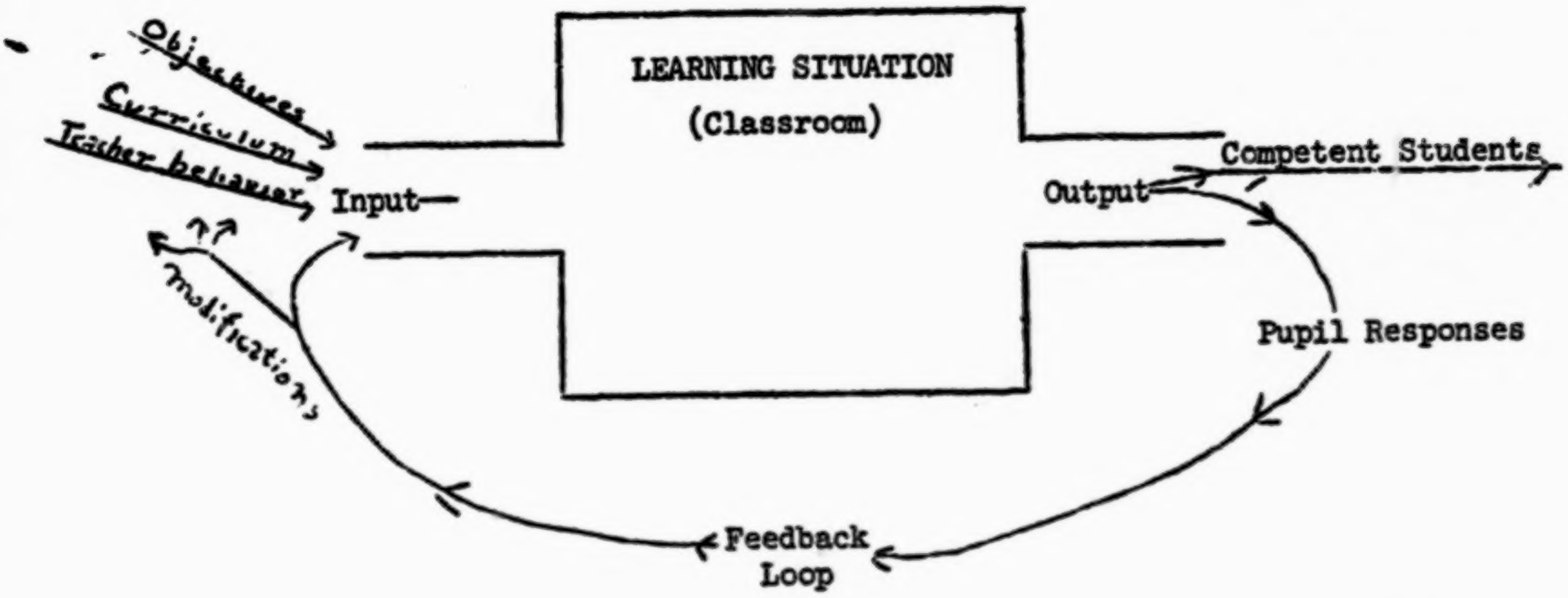

LEARNING SITUATION
(Classroom)
Objectives
Curriculum
Teacher behavior
Input
Output
Competent Students
Pupil Responses
Feedback
Loop
modifications

FIGURE 2

The Classroom as an "Open System"

input act upon the student within the system.

During the training process, the output of the system is not the student, but the responses of the student, as he acquires skills and knowledge. Thus there is a phase, (and this phase is essentially as long as the training course itself) in which the only "reading" of the output of the system is the assessments of how the students are learning. These assessments or readings at the output are fed back by the teacher in the form of modifications in the process of instruction. Teaching may be accelerated, slowed down, or qualitatively altered, to accord with the desired responses and the schedule of the curriculum. Thus, it is through the feed-back loop that adjustments are made for the rate of learning and the kind of learning the students exhibit. It is the teacher, in the classroom situation, who reads the output (i.e. student responses during training) and makes the adjustments or modifications in the training procedure. The functioning of this feedback loop may be seen as being analogous with the operation of a thermostat which adjusts temperature in a room by reading the ambient temperature and signaling the system to increase or decrease its operation. When a desired level of temperature is reached, it is maintained at values close to that level.

Current usage in modern foreign language education specifies objectives in terms of four language skills: listening comprehension; speaking; reading; and writing. The curriculum, however, contains a specification of phonetic, structural, and lexical items. The objective of the teacher in any semester is to develop mastery in the use of the features of the language specified in the curriculum. An implicit assumption is made that if the student masters the curriculum, he will be fluent in respect to the four major objectives as they are specified for foreign language education. If it should prove that the student is not proficient in respect to the listed skills after completing a course, the lack may be attributed either to the fact that the student did not master the curriculum or to the fact that the items specified in the curriculum do not--even if perfectly mastered --yield proficiency in respect to the four skills. Thus, it may be seen that proper use of the feedback-loop during the semester may include not only revisions of teaching procedures and the development of remedial procedures, but also revisions of the curriculum. The latter may occur also after the semester while the system waits for a new input of students. Returning to the analogy between the classroom and a heating system, it may be noted that the expression "the desired level of temperature" is analogous, in the case of the thermostat, to the objectives specified in terms of proficiency levels for the four language skills in the case of foreign language instruction.

Relevance of the Model to the Instrument

The observation schedule itself does not necessarily comprise a part of the teaching "system." If the technique were to supply teachers with additional feedback data which would further modify their behavior, the technique would comprise part of the system. The model, however, is relevant to the development of the instrument in a number of ways. First, it implies that the instrument must make provision for categorizing teacher "moves" that are responsive to students' behavior, as well as for those moves which are responsive to the prescriptions of the curriculum. The instrument should be expected to distinguish effectively teachers whose orientation is mainly in the direction of the curriculum from those who are essentially responsive to pupils.

Second, the effects of disruptions on the feedback loop upon the classroom should be made manifest by means of the instruments.

Third, the model assumes that, at least to a degree, the teacher must operate with plans and that these plans are contingent, for their execution, upon the behavior of pupils. Short range plans, of a few minutes duration, as well as general curricula are implied. For example, a teacher may attempt to train students to form correctly the second person plural in the present tense of a certain class of verbs. He may plan a series of moves in which: (a) a number of examples are shown first; then (b) students are required to attach the correct ending to a few verb-stems that were not among the examples; after which (c) one of the students is asked to induce the relevant generalization; and finally (d) a drill is executed, in which the form is produced by students. A procedure of this nature is contingent upon students: (a) recognizing the nature of the ending to be supplied after the examples are shown; (b) forming the generalization; and (c) learning to perform the drill effectively. If, however, most of the students in the class fail to come up with correct formations after the first examples are given, he may add more. If the generalization is not forthcoming, he may supply hints or explain it himself. If the drill progresses haltingly, he may reduce the complexity of the task or return to presenting examples.

The observation schedule and recording technique should be sensitive to lengthy sequences for accomplishing specific objectives and to modifications in plans. The profiles generated by teachers who operate without plans, or with few plans, should be easily distinguishable from those who plan much.

Both the model and the objectives of the project imply the necessity for determining whether certain teacher behaviors were successful (i.e., the determination of whether pupils learned). The criterion may be the teacher's assessment itself. If the instrument permits the recovery of temporal sequences, it provides for the assessment of the contingencies between one set of events and another.

Finally, the model itself seems to generate the prediction that little, if any, implementation of a single educational innovation superimposed on other objectives will be observed in any short period of time. If the teacher is at all sensitive to the feedback he receives, and if he takes seriously at all the objectives of his teaching, he is likely to be constantly adjusting to a lag in the achievement of one or another objective. This leaves him little time or energy for implementing an experimental innovation. Further, if an innovation does not seem to him to further his original objectives, or if it seems to be at variance with them, he is likely to abandon it, even if he does so unconsciously or with the subjective belief that he will return to the innovation once he "catches up" with his other objectives.

Some Special Characteristics

The present schedule was prepared for use in contemporary foreign language classrooms and formulated in the context of a project studying the development of a specific cognitive strategy. This fact generated certain characteristics that are specific to it.

When foreign language instruction occurs in the "new key" there is probably greater homogeneity from class to class in respect to procedures than in other subject matter areas. It would not be totally unfair to say that, essentially, teachers in these classrooms spend a large part of their teaching time as administrators of a curriculum rather than as generators of teaching procedures. Some curricula in extensive use spell out all drills and exercises in very close detail. Indeed, there is considerable similarity between some of the curricula in use and programmed instruction.[4] Of course, some of the best and some of the worst teachers depart reasonably frequently from a slavish adherence to these prescribed procedures. Observations using the systems-model as a point of departure may be useful for determining what happens to the procedures when feedback from the class indicates that they are not appropriate.

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[4] The curricula and teacher-training courses in the foreign language field often specify precisely what teaching procedures are to be used almost for every fragment of curricular materials. The teachers' manual for one widely received curriculum goes as far as specifying with symbols,what questions or drill items are to be addressed to the whole class, a part of the class, or to a specific individual.

Another special characteristic of the contemporary foreign language classroom is the fact that efforts are made to conduct as much instruction as possible in the target language. Thus those elements of teacher behavior which might be classified as procedural or motivational, and ordinarily of no substantive consequence in other types of classrooms, may take on an aspect of substantive instruction in the foreign language class. Being told to "keep quiet" in French provides practice in comprehending French.

Nature of the Data, Coding

The foreign language classroom was considered to be the direct source of data for analysis. It was considered desirable to reduce to coded data on the instrument every nuance and every attribute of all events occurring there. Every attenuation of the raw data by recording devices and coding procedures introduces possible sources of bias since not all interference is random noise. Since the process of coding from the actual events to the instrument could not occur rapidly or objectively enough to proceed directly from the events to the coding sheets, class sessions were tape recorded as a means for preserving the raw data as close to its original form as possible. Some of the recordings were accompanied by running accounts prepared concurrently by observers. Some tapes were recorded stereophonically with one of the microphones situated among the pupils and the second one situated near the position the teacher usually occupied. Other recordings were prepared without the advantage of a second microphone and second channel. These were sometimes defective in respect to how student responses were picked up. Since these responses are frequently in poor French, they are, in any event, hard to comprehend.

The tape recordings were transcribed by a bilingual typist. These protocols were used in the first attempts to use the instruments. Coding is most accurate when the coder works with the running account, the tape recording and the transcription. It was hoped, with increasing familiarity with the instrument and skill in coding, the preparation of transcriptions might be omitted. Experience revealed, however, that the coder became increasingly dependent on the transcription and tended to ignore the cumbersome tape recording.

The present analysis was concerned essentially with teacher behavior. Assessment by the coder of the actual responses of students was not of interest. The teacher's assessment of the student's response was deemed important, however, because the operation of feedback loop is contingent on the teacher's perception; not the coder's. Yet in instances when the teacher's assessment of a pupil's response is not clearly inferrable from the teacher's response it is valuable to be able to recover what the pupil did say.

Behavioral Units: Moves; Maneuvers; Tactics; Strategies

The classification of behavior under observation depends upon partitioning of behavioral units. Four kinds of behavioral units were designated for consideration: moves, maneuvers, tactics, and strategies. Each of these units is of a higher order of magnitude than the preceding one and represents groupings of the preceding units. Thus ascending levels of discourse are implied by the behavioral units.

The three upper behavioral units are presumed to occur as a consequence of objectives of the teacher. In using this technique, objectives of behavior are freely inferred despite the fact that these may not be directly observable. In inferring objectives it is advisable, however, to have available corroborative evidence. Such evidence is usually available in the specified objectives of the teaching, in the curriculum, and in the teacher's lesson plan. Subsequent direct questioning of the teacher is also conceivable.

The assumption that the behavior of teachers is directed toward objectives and the liberty taken in imputing these objectives follows from the systems model and represents a significant departure from other extant classroom observation techniques. Systems in their entirety are characterized by the fact that they have functions--even if the function is merely their own perpetuation. The components of the system exist to facilitate the functioning of the system and thus have functions themselves. To speak of the objective of a behavioral unit is merely to speak of its function in the context of the functioning of the classroom as a system for training students.

At the lowest level of discourse the behavioral units are designated as moves. Generally, a move may be considered to be an act, most often verbal, but possibly gestural, by a teacher calculated to elicit a very specific response from a student, or to supply him with a very specific unit of information. A list of kinds of moves, presented as the "taxonomy of the observation schedule" is discussed below. It is to be noted that the classification of system is in terms of moves, the lowest order unit of behavior.

In the foreign language classroom, many, if not most, teacher moves are interchanges. That is to say, they are bounded before and after by pupil responses. Thus, teacher moves usually occur one at a time; a single elicitation of a response, a single correction. Sometimes two such moves are linked together. In these instances, the boundaries of moves are easy to identify. Under other circumstances, the identification of a single move depends upon its identifiability according to the taxonomy.

When a group of moves may be joined together, under circumstances that make it reasonable to infer that the teacher had a specific objective in mind, this group is designated as a maneuver. A maneuver will contain not only a few moves by the teacher, but usually also some responses by one or more students. The objective of a maneuver is usually the acquisition by students of a very small specific item of knowledge or skill. An example of the objective of a maneuver might be: "that the students notice that the second person plural in the present tense is formed by adding -ez to the verb form."

On the next level of discourse above maneuvers, that is to say, on a level involving a larger behavioral unit, there are tactics. A tactic is a group of maneuvers or a single maneuver plus a few miscellaneous moves which may be bracketed together because they are directed toward an objective that is somewhat more general than the objective of a maneuver. For example, a tactic may have as an objective "the fluent production of second person plural verb form."

Next there are the strategies. Strategies may be defined as the aggregate of all behaviors calculated to achieve a major curricular objective. A strategy will be comprised of moves, maneuvers, and tactics. An objective for a strategy may be: "the complete mastery of the French verb in the present tense, with the ability to form it fluently and appropriately in a large variety of written and oral contexts."

The process of grouping units of behavior into maneuvers, tactics, and strategies is designated by the term bracketing. On the observation schedule, bracketing is coded by marking the first move of a unit and carrying the bracket to the end of the unit. Provision is made for each of the echelons of behavioral units. Moves that are not relevant to the behavioral unit in which they occur are also to be distinctly marked.

It may be expected that some teachers will concatenate their behavioral units. That is to say, they may make moves within the confines of one major unit that are not relevant to it, but are relevant to an objective to be achieved later in the curriculum. The bracketing of such concatenations requires astute analysis by the coder and can sometimes be missed. (Consultation with the teacher would seem to be useful in such instances.)

There are, of course, curricular objectives that occur at still more general levels of discourse. Since these are usually not to be achieved within the single class lesson, they are not likely to be of any great relevance for the present observation schedule. However, since the achievement of curricular objectives is always contingent upon sub-units of behavior, the general notion of echelons of behavioral organization embodied here can be maintained, if it should prove desirable to analyze data at these higher levels.

The Modes

All of the moves which are to be enumerated in the taxonomy below are to be classified in respect to modes. The first of these modes is designated the language in which the move occurs. In the inference project, each move is coded in respect to whether it occurred in French or English (F/E). The second mode is the designation of the kind of class participation (class). In this mode every move categorized as to whether it was addressed to the whole class, (W), part of the class (P) or an individual (I). The coding of the modes occurs concomitantly with the coding of each move. Every move recorded on the tally sheet is accompanied by an indication of whether it occurred in French or English and whether it was addressed to the whole class, part of the class or the individual.

A third mode, oral-written which distinguished whether the teaching event occurred by word of mouth or on paper or on the blackboard *might* have been added. But the sample of moves coded for this project was predominantly **oral mode** and little or nothing was to be gained by retaining this mode.

The Feedback Loop

Student responses and moves initiated by students, such as questions or comments that are voluntarily supplied, are not directly coded in the present form of the observation schedule. Instead, the teacher's acceptance or rejection of the student's response is noted and entered as the essential record of the feedback loop (FBL). Since a very large proportion of teacher moves followsupon responses by the students, the noting of the teacher's response to student responses is almost obligatory as part of each interchange. Discussion of criteria for coding assessment of pupil responses occurs in the discussion of management and evaluative moves.

Suprasegmental Moves

Provision was originally made in the observation schedule for the fact that a teacher may accomplish two moves at the same time. A teacher may, while developing a drill, move to a part of the room where there is a disturbance and put her hand upon an offending youngster, or call on him, thus controlling the class. Quieting the youngster may be categorized as a "management move," while the drill would be categorized as an "elicitative move." We have chosen the term "suprasegmental" to describe a move that occurs concurrently with another move. The term is borrowed from linguistics, where it is used to describe the modulations and variations in accent patterns and intonation patterns, temporally co-occurring with other linguistic units, that change the meanings of words or sentences.

The tape recorded data used for the present study was limited in the possibility for observing suprasegmental moves. Thus the notion, while promising, was abandoned.

Taxonomy of the Observation Schedule

Figure 3 is an abbreviated form of the data sheet to be used for coding classroom events. This figure appears on the following page. On the left of the figure, the complete list of moves is given. These moves are defined in the discussion below. The moves may be divided into three general categories. These are:

(a) Management and evaluative moves
(b) Presentive moves
(c) Interaction moves, which can be further sub-divided into
  (i) corrective moves and
  (ii) elicitative moves

For the purposes of the present study elicitative moves are broken down into fine detail in respect to one special kind of elicitation, namely elicitation of inference.

Management and Evaluative Moves

There are eight management and evaluative moves in the present schedule. These moves are considered to be "non-substantive," although these moves may occur in the target language, and actually provide students with practice in comprehending the language and an opportunity to make inferences. Their substantive possibilities can be recovered by checking the language mode in which they occur. A description of each of the management and evaluative moves follows.

1. Praises Response. "That's good, Johnny." A response may be praised although it is not accepted. "You're on the right track, but that's not quite it." The latter example would be coded as "praises response," but as a rejected response in the feed-back loop.

2. Criticizes Response. "That was not very bright, Bill." A teacher may criticize a response while still accepting it. "You took the easy way out, lazy-bones!" and continue to the next question. In such an instance, the response may be coded as

FIGURE 3

Data Sheet for Coding Teacher Behavior

			Brackets										
		Strategies											
		Tactics											
		Maneuvers											
			Feedback Loop										
		Response (A/R/U)											
			Modes										
		Language (F/E)											
		Class (W/P/I)											
			Moves										
Management	and Evaluation	Praises Response											
		Criticizes Response											
		Non-Evaluation of Response											
		Recognizes Question or Comment											
		Motivates Positive											
		Motivates Negative											
		Describes Procedure											
		Directs Procedure											
	Presentive	Exposition from Text											
		Verbal Exposition											
		Exposition by Modeling											
		Exposition by Special Means											
INTERACTION	Corrective	Repeated Elicitation											
		Clarifies											
		Prompts											
		Models											
	Elicitative	Elicits Reading											
		Elicits Memorized Materials											
		Elicits Drill											
		Elicits Imitation of Model											
		Elicits Information											
		Elicits by Prompting											
		Elicits Inference											
			Subject Matter										
	Subject Matter	Phonetics											
		Morphology											
		Syntax											
		Lexicon											
		Meaning											
		Background											
		Psychological											
		Irrelevant											

Time

0 0

NOTE: This code sheet is to be used by entering tally marks in the appropriate cells. Vertical lines imply the boundaries between moves. This system is readily adapted to sheets that can be processed by optical scanners.

accepted on the feed-back loop line while the teacher's move is categorized as "criticizes response."

3. Non-Evaluation of Response. The teacher repeats the response in a neutral voice or utters an expression such as "hm-Hm" or "yes," in a non-commital way. On the feed-back line, non-evaluated responses may be coded either as accepted, rejected, or unknown. If a non-evaluative response is followed by a new question (that is not corrective), the response may be assumed to have been accepted. If the teacher asks the question again from another student, or rephrases or clarifies the question, the pupil response may be noted as rejected. Of course, there will be instances when the pupil response must be coded as unknown. The coding "non-evaluation of response" does not occur when the teacher merely asks the next question, although asking a new question usually implies an accepted prior response.

4. Recognizes Question or Comment. This move occurs when the teacher answers a question or indicates that the comment was relevant and interesting or discusses it. The feed-back loop is also coded as an acceptance for the pupil-initiated response. If the teacher indicates that the question or the comment was irrelevant, of course the pupil-initiated response is coded as rejected in the feed-back loop.

5. Motivates: Positive. This kind of move occurs when the teacher explicitly promises a reward prior to the response and is to be distinguished from praising responses. "Who will try to do this for five extra points?"

6. Motivates: Negative. When the teacher threatens punishment for poor performance or failure to perform, the move is coded "motivates negative." "You'd better get it right" or "If you can't get this, you may have to drop French." Criticizing responses and negative motivation are to be distinguished from each other by the fact that criticism follows a response while the negative motivation precedes a response.

7. Describes Procedure. This type of move occurs when a teacher explains how a drill is to be conducted, homework is to be done, etc. It usually occurs in a declarative tone of voice:

"Today we will do some pattern practice. In pattern practice we change the verb forms. . ."

8. Directs Procedure. Direction of procedure occurs when the teacher uses the imperative mood in her speech and makes explicit each step of the procedure as he goes along. "Take out your books. Open them to page 45." Note that if the drill calls for reading, coding in terms of "directs procedure" ends at the point where the books are opened and the command to do the drill is given. After that, coding under interaction moves (see below) begins.

Subject Matter: Presentive and Interaction Moves

Presentive and Interaction moves are concerned with imparting subject matter to students. The present technique requires that such moves be coded both in respect to teacher behavior and in respect to the subject matter content they are intended to impart. (This requirement proves to be useful in assisting coders to locate the boundaries of moves, since changes in subject matter content supplies a good criterion for marking the end of a move if the move is not an interchange.) The effects on pupil achievement of emphasis on various subject matter areas in language is a matter of considerable concern in current discussions in foreign language education. A technique that can make available objective data as to the amount of emphasis on each subject matter area in any class should, therefore, prove quite useful in further research. In the present study, the practice of coding moves in respect to their subject matter issues from a concern for the kinds of inferencing that can occur in the foreign language classroom.

The categories of linguistics are quite useful for categorizing a large fragment of subject matter in a foreign language class. Subject matter may deal with phonetics (Ph), morphology (Mph), syntax (Snt) or lexicon (Lxc.). The coding for lexicon is to be reserved for "word study" in general and for discussions of derivations, etc. Concern with the meaning of a single word or the meaning of a sentence, etc., is coded as meaning (Mn) as well as the semantic implications of grammatical distinctions.

In addition, Background (Bkg), refers to "civilization and culture" and any other material related to culture or language in general, for example, general linguistics. A category called psychological (Psy) codes any presentations on the part of teachers that are relevant to the psychological issues of how to go about learning. Any discussion of methods of study or indications as to how students are to think about the subject matter is tallied as "psychological." Moves which are irrelevant to the objectives of the course are coded as such (Ir). Some of these may occur perhaps to relax the class, when work is completed, or occur in the target language and provide general practice in listening and speaking.

Presentive Moves

There are four categories of presentive moves in the present schedule. Presentive moves may be described, generally, as those expository moves in which the teacher tells or explains subject matter to students, but does not require responses from them. The list of definitions of presentive moves follows:

1. Exposition from Text. This move occurs when the teacher reads from a text to the class. Provision is made for timing these moves and noting changes in content, since such material may be lengthy and comprise several moves.
2. Verbal Exposition. Moves are coded in this category when the teacher himself makes some description about subject matter.
3. Exposition by Modeling. "Modeling" refers to the moves in which the teacher produces sounds, words, or sentences in the foreign language for imitation by pupils. This move is very frequent in the foreign language classroom. It is expected that the subject matter dealing with modeling will most frequently be phonetic. Repeated modeling is to be classified as drill (see below). Modeling also occurs as a corrective move and as an elicitative move.
4. Exposition by Special Means. Exposition by special means refers to the use of "props." Included are the blackboard, slides or tape, film, "informants," flannel boards, etc.

Corrective Interaction Moves. In general, as was noted, interaction moves are ones which precede or follow responses from students. They are divided into two categories "corrective moves" and "elicitive moves." Corrective moves refer to those moves which occur when the pupil has made an error in the previous move and coding will, therefore, be correlated with coding in the feed-back loop. The four types of corrective interaction moves are defined below:

1. Repeated Elicitation. This move refers to the repetition of a question which was not acceptably answered.
2. Clarifies. A move is categorized as clarification if, after a pupil responds, the teacher provides an exposition repeating or further clarifying the response. Clarifications are distinguished from exposition by the fact that they follow a response by a student rather than precede it. "This is the second person plural. Add -ez."
3. Prompts. When a student falters and the teacher begins the required response, prompting may be said to occur. Prompting is categorized as a corrective move only when there is evidence that the student falters. It is to be noted that prompting also occurs under elicitative moves (below) when the prompt is simply used as a cue for the student to respond.
4. Models. Modeling as a corrective move occurs frequently when the student pronounces a sound or word incorrectly or produces a grammatical form or sentence incorrectly. A student may emit a response. The teacher will produce the response correctly and require the student to produce the response again.

Elicitative Interaction Moves

The elicitative interaction moves are perhaps most conducive to expansion for special purposes. Inference elicitation was expanded for this project and is described more fully in the next section of this chapter. In all other instances, the present categorization presents this class of moves in its most general form.

1. Elicits Reading. Any requests for students to read materials are coded as "elicits reading."
2. Elicitation of Memorized Materials. Requests to recite dialogues, poems, etc. are coded as "elicitation of memorized materials." Materials presumably memorized before coming to the class are referred to. The actual memorization of materials *in* the classroom would be coded under the kinds of elicitation produced for this memorization.
3. Elicitation for the Execution of Drill. Usually, after the first few weeks of the semester, students are quite familiar with the standard procedures for drills and a simple cue will elicit one or another type of drill. This is not the case when management moves must precede the elicitation of the execution of drill. The type of drills that occur may be categorized rather specifically. A paper by Hok (1964) presents an excellent example of a systematic categorization of drill procedures that might be easily adopted to this observation technique.

4. Elicits Imitation of Model. It may be seen that the modelling move described above may occur as presentative, corrective and elicitative moves. The model may either be a single sound in the language, a morpheme, a string of morphemes or a sentence.

5. Elicits Information. Elicitations of information will probably usually require rather lengthy responses. It is to be noted that sometimes the request for information is intended to do no more than provide an opportunity for practicing the target language. The content of the information elicited is nevertheless categorized as in the same manner as any other content, even if this implies extensive use of the "irrelevant" category with the elicitation of information.

6. Elicits by Prompting. Elicitation by prompting occurs when the teacher cues a response by beginning the response. It is to be distinguished from prompting in the corrective mode, where it must be apparent that the student stammered or responded incorrectly prior to the prompting.

7. Elicits Inference. An elicitation of inference requires a student to produce a response he may never have produced before, or he may be called upon to recognize linguistic material he has never seen before. He will be required to do this on the basis of cues that are either made available to him or are presumed to be in his memory.

Expansion of Inference Elicitation

Figure 4 shows special observation schedule for classifying inference elicitations. This figure appears on the following page. Inferences occur *from* cues *to* responses. The classification of cues described in Chapter I was retained for the schedule with some slight modification. The cues are assumed to have been made available to students by means of some form of presentive moves. The definitions of the types of cues follows:

Intra-lingual cues are those which are related only to the target language. They may be series of regular examples of any structural feature of the language from which a rule is to be inferred or induced. They may be any information about the target language which would supply the student with a grammatical framework. They may be information (or reminders) about etymological features, roots, affixes, etc., which have semantic significance in the language.

Inter-lingual cues provide for inferences derived from the relationship between the target language and the student's own language or other known languages. These are borrowings, cognates and derivations. Known rules for regular transformations between languages provide for inter-lingual inferencing. For French-to-English, direct cognates such as *restaurant*, *nation*, or the use of the rule that French /ô/ often indicates a lost /s/ which may exist in the English evquivalent, would be classed as inter-lingual cues.

Extra-lingual cues are those which provide information about the semantic content of the linguistic material under consideration. This includes: a) hints about contextual cues based on the way language functions to represent the real world and on objective context of cause and effect; b) natural and human phenomena; c) cultural explanations; and d) definitions of words given either in the target or source language, etc. The first three of these are classed as *pragmatic* information, and the last are *definitional*. An example of a pragmatic cue would be background information on the geography or

FIGURE 4

Expansion of Inference Elicitation - Data Sheet for Coding

	Inference from:										
CUES SUPPLIED	Intralingual										
	Interlingual										
	Extra-lingual										
	Repeated Examples										
	Inference to:										
A. RESPONSE REQUIRED	Phonetics										
	Morphology										
	Syntax										
	In Form of:										
or	Type										
	Token										
	Inference to:										
B. RESPONSE REQUIRED	Word Meaning										
	Passage Meaning										
	In Form of:										
	Translation										
	Paraphrase										
	Definitional Sentence										
	Execution of Task										
		Feedback Loop									
STUDENT RESPONSE	Accepted										
	Rejected										
	Unknown										

cultural setting of a reading text. Types of definitions given by the teacher are obviously the second group.

Inferences may occur to grammatical issues or to semantic ones. Inferences to grammatical issues are concerned with the phonetic, syntactic, and morphological features of language. They occur either in the form of generalizations and rules, labeled "types" or in the form of examples, labeled "tokens." The semantic content is secondary in this type of inference since the patterns of the language are really what are being taught or dealt with. Elsewhere in this report this kind of inference was called "induction."

Examples of an inference to "type" would be the production of generalizations concerning the function of a particular tense ending, positions of object pronouns, or the types of vowels in the target language, etc. Inferences to "token" are actual utterances in the target language, perhaps revealing knowledge of how the rule works. They may represent a jump from previous examples to a new example without the intervening formulation of a generalization, or may be generated directly from some stated rule.

Inference to semantic issues are concerned with the meanings of a linguistic unit. Inference of the meaning of an unfamiliar word embedded in a context of mostly familiar reading material is a typical example. In this second type of inference, much more uncertainty is possible than in the first, where specific items are pretty much correct or incorrect. Inference of word meaning has to be just specific enough to permit understanding of the text unless acquisition of the item, instead of reading comprehension, is the required goal. In any case, the emphasis here is upon the pragmatic situation or information represented by the language, and not upon the way a language functions.

General Coding Procedure

The observation technique is concerned with several dimensions. Every move occurs in one or more modes and must be coded accordingly. Further Presentive Moves and Interaction Moves are concerned with subject matter and must be coded in this respect. Thus,a move may be designated by several categorizations or tallies on the code sheet.

The columns on the sheet represents the boundaries of move or interchanges. If an interchange is implied, a tally of the teacher's response to something done by a student will occur in the feedback loop.

The bracketing, or organization of moves into large units, maneuvers, tactics, and strategies is accomplished by appropriate markings at the head of the columns.

From the code sheets all quantifications, contingencies and characterizations of teaching behavior are to be derived.

Observation and Generalizations

It was not within the scope of the project to analyze more than a few of the protocols by the tallying procedure outlined above. Thus, no quantitative data can be given indicating whether the experimental teachers actually did increase the number of inference eliciting moves in their classes. The tallying that was done, however, together with careful reading of the remaining protocols with eyes that were alerted to the categorizations described above, has made it possible to advance some tentative generalizations and observations about the behavior of the teachers participating in the experiment.

First, it was observed that the total number of inference eliciting moves, (as defined by the criteria above) proved to be very small indeed, even in the latest protocols. There were never more than six or seven occurrences to be found in any one class session and frequently fewer. These were primarily cases of definition or etymological cues supplied by the teacher to aid in word meanings. This occurred despite the fact that motivation was never a problem. Teachers were eager from the beginning to work on ways to improve their classroom performance in eliciting inferences from students. As indicated, they particpated enthusiastically in both group and individual sessions with project staff, and consistently did additional volunteer work in developing their own lessons through the course of the study.

One factor that was likely to limit the amount of change in teacher behavior that the training procedure could generate emerged from the analysis. It is perhaps obvious, but worth emphasizing, that competence in the language being taught was definitely a crucial element. A teacher's ability to elicit inferences successfully depends very much on his own command of French. If he was at ease in the language, had a large vocabulary of synonyms and could rephrase and define effectively, or give additional examples, he was able to provide the good cues for good inferences and for good inference making habits.

On the other hand, if a teacher could not or did not really use the foreign language as a medium of communication, but rather as a limited body of equivalents for English, he would be likely to: a) ask for English "one to one" translations or grammatical explanations as responses; and b) give cues in English or c) just give the English.

This latter situation would result in continual mixtures of the two languages, with an emphasis on the actual English words called for in a good translation rather than on the concepts delimited by various kinds of cues. Since a project of this nature could not attempt to improve this kind of facility in the foreign language, teachers could utilize suggestions for method only to the limits of their own fluency. Thus, the language mode proved relevant.

Further, if change was linked partly to security within the language, it was also conditioned by habitual relationships with students and by the class climate, as evidenced by approval or disapproval for correct response.

A fairly fundamental difference of attitude was perceived between teachers who use a foreign language class primarily as a testing place and others who use it more for teaching or imparting subject matter. Some teachers tend to require their students to show how much they do or do not know, and how much work they have done outside of class. Others seem to proceed more with the assumption that testing will occur at some later time, and that their primary task is to present material and work through the learning process for the class. In the observation schedule this was reflected as preferences for presentive moves and elicitative interaction moves as opposed to preferences for corrective interaction moves. Although in the management and evaluative moves differences in "praises" vs "criticizes" response and "motivates positive" vs "motivates negative" were to be observed, the group of teachers involved markedly preferred priase to criticism and reward to punishment.

The system of double-tallying inferences in terms of "inference from" and "inference to" highlighted a phenomenon of defective inferencing in the foreign language classroom on the part of pupils. Students required to infer the meaning of a French word in a context would frequently focus completely upon the cognate and ignore both intra-lingual and extra-lingual cues that were supplied in abundance. This frequently led to absurd guessing. It may be the conjoint consequence both of a psychological set generated by earlier training to focus on cognates and by insufficient training in wide scanning and careful validation. (It is hoped that improved measures of inference making behavior will aid in shedding light on this question.) When a student's attention was called to the need for determining grammatical category or appropriateness to context, he was generally able to improve his guess; but the habit of doing so independently seemed very rare in classes observed.

The special expansion of inference elicitation makes it particularly important to distinguish between elicitations involving simple recall or reworking of grammatical points (i.e., "elicitation of memorized materials" or "execution of drills") and inference elicitation. It was sometimes necessary to check the curriculum in order to distinguish between these.

On occasion it was even more difficult to categorize elicitations of simple restatements of parts of the text. Students can sometimes do this without comprehending the text. Questions may also be phrased in "either" or "or" form so that they provide practice in production but may not necessarily reveal comprehension. These elicitations were not categorized as inference eliciting even though students may have made inferences. They are referred to as "non-inference elicitation moves" in Appendix A where examples of these moves are shown. It was felt that procedures of this type did not contribute to the educational objective of developing an awareness of the inference process.

Teachers were found to differ in their use of inference-eliciting procedures. Some elicited inferences only after no response or an incorrect response had been given. In the protocols examined, this was found to be rather frequent. Cues for inference were supplied by teachers after the flow of presentation or questioning was interrupted by student error. More rarely (and perhaps more desirably), teachers proceeded in the manner of linear programs supplying cues in advance, eliciting inferences step by small step and using maneuvers, tactics, and strategies that would elicit few errors. Examples of these different moves will be found in Appendix A which contains verbatim transcriptions of examples of the procedures discussed above:

A. Non-inference elicitation moves:
    1. mixture of French-English
    2. elicitation by "testing"
    3. elicitation of text phrases
B. Inference-elicitation moves:
    1. by induction-"discovery"
    2. by visual cues -- gesture, picture, etc.
    3. by word analysis cues
    4. by types of definition
    5. by context cues.

Chapter VII

FOR STUDENTS: THE INFERENCE TREATMENT

This chapter is concerned first with the lessons presented by the project staff in the experimental classrooms. A total of four lessons were presented. The first, dealing with the canons of inference, was given by Dr. Carton. The remaining three, dealing with "context cues," were prepared and presented by Mrs. Magaud. An evaluation of the effectiveness of the three context cue lessons in improving the ability of students to learn the meanings of new French words from a passage of text is reported upon in Chapter X. Testing techniques that seem to have didactic value are mentioned. Finally some of the materials provided to teachers for use in their classes are described.

The Canons of Inference

Fifteen Turkish words and two structural characteristics were chosen to illustrate the canons of inference. The focus of the lesson was upon making the process of inference explicit. Thus some pupils were told to play "psychologist" and to take on the task of explaining the mental processes their classmates went through to arrive at the answers they gave.

The *"What's-new?"* paradigm (see Chapters IV and V) was illustrated simply by pointing to an object. The probabilistic component that occurs even in this paradigm was illustrated by the fact that some students could be led astray if the teacher looked at one thing and pointed to another.

Two objects were presented with their names to illustrate the *What-else-is-new?* paradigm. In some classes students discovered that by proper questioning of the informant they could eliminate ambiguity.

The possible use of cues internal to an unfamiliar linguistic unit was illustrated by presenting the word *gözluk* ("eyeglasses") and later presenting all the parts of the face including an "eye," *göz*. Despite the fact that the names for the face parts were scrambled in their presentation, so that the probability of matching *göz* with "eye" as the first item was low, students achieved this immediately and were able to explain how they did it.

Yet if the teacher asked to have other gözluk pointed out to him in addition to those eyeglasses he pointed to, pupils indicated window-glass and clock faces. The danger of this kind of generalization was clarified. Many of the students noted that they were trying to respond with what they thought the teacher wanted of them and offered "window" for gözluk because the teacher looked in the direction of the window. The point that validation must wait for corroboration or questions was strongly emphasized. Further, it was shown that the teacher need not be the source of corroboration.

The lesson also included an illustration of the isomorphism between the inference paradigm (What's-new?, What-else-is-new?) and single linear and simultaneous equations. In some classes the notion of probability and the adjustment to favorable and unfavorable probabilities were touched upon.

Context Cues

The three lessons on context cues dealt essentially with the utilization of extra-linguistic cues in inferring unfamiliar words while reading texts.

The first lesson dealt with how context frequently signals that a meaning is provided, and was thus also indirectly concerned with intra-lingual cues. The outline of the lesson follows:

Context Cues - Lesson One

Outline

1. Discuss What is the "meaning" of a word?
    a. - Compare dictionary meaning and meaning in the context of particular occurrences.
    b. - Dictionary meaning - "lowest common denominator."

2. Explain purpose of reading comprehension tests, use of context to guess meaning of unfamiliar words. (List of isolated words, then words in reading text).
3. Discuss steps in the process of guessing the meaning of "coruscated" in the sentence (written on board): "The clouds parted momentarily, and snow on the mountaintop coruscated in the rays of the rising sun." (Twaddell, 1963, p. 14).
    - a. - Verb ending in " -ed", therefore past tense.
    - b. - Describes what the snow did with relation to the rays of the sun.
    - c. - Situation - snow covered mountaintop, sun through clouds.
    - d. - Possible equivalents - shone, glistened, etc., melted.
    - e. - Narrowing down process - "momentarily" implies a brief period, probably not enough for melting, but enough for reflection of some kind.
    - f. - Familiarity with snow, that is, the context of reality makes guessing easier - more difficult for someone who has never seen snow.
    - g. - This guess makes it possible to go on reading.
    - h. - Summary - One uses the grammatical cues, (unconsciously in one's native language) plus etymological cues, roots, affixes, etc., plus the situation context cues to narrow down the possible and probable meaning of an unknown word encountered in reading, and then goes on with this "sufficiently definite" meaning in mind. Confirmation or rejection of the initial hypothesis may come later.
4. Review and define the kinds of cues:
    - a. Grammatical or structural (intra-lingual-features).
    - b. Word analysis-etymological (intra-lingual) cognate (inter-lingual).
    - c. Context - "meaning" of passage situates the word or words either in the immediate sentence, or in larger context of paragraph or story.

5. Illustrate grammatical narrowing-down process with French nonsense sentence (written on board) "Le barratineur a pavoisé la baraque avec des liquettes." Request information shown by sentence on parts of speech, ending, role, and relationships.
    a. barratineur -- eur = noun marker "13", masc. agent
    b. a pavoisé - verb, 1st group, passé composé, transitive
    c. la baraque - object of verb, marked by "la", fem. noun
    d. liquettes - marked by "des", feminine-type ending, something used as object of prepositional phrase
    e. avec, des - markers
6. Discuss Twaddell list of what questions one asks about different parts of speech after they're identified.
7. Ask for key questions one asks to situate a reading passage - "newspaper article words" who, where, what, when, how, why, and request key words from test students took.

Further discussion was based on a conceptual scheme for the analysis of context cues in English developed by Deighton (1959) with adaptations into the appropriate French counterparts. Deighton's two-part attack consisted of: a) word analysis on the basis of certain roots and affixes; and b) analysis of the operation of context. It proved extremely valuable for formulating the lessons. An outline of Deighton's scheme follows.

The Operation of Context

A. Definition - i.e., use of a form of "to be" or similar expression

B. Example - definitions are signaled by certain words such as:

"such"
"such as"
"like"
"especially"
"either/or"

"other"
"this"
"these"
"(in) the way (that)"

C. Modifiers - use of words, phrases, clauses - often after a verb in the position of a predicate adjective.

D. Restatement - (conscious expansion of ideas) use of:
   1. appositive construction
   2. or with synonym
   3. introductory phrases signaling conscious restatement
      "in other words"   "what this means"
      "that is"   "which is to say"
      "to put it another way"   etc.
   4. mechanical devices - parenthesis, dash, colon, quotation marks, etc.

E. Inference - (where relationships are not explicit, calling for careful reading, cross-checking, and decisions on very partial or ambiguous evidence) use of:
   1. parallel sentence structure
   2. key words repeated in passage
   3. use of connecting words:
      "however"   "hence"
      "yet"   "similarly"
      "therefore"   etc.
   4. restatement (unconscious or indirect) of same or opposite ideas
   5. pure inference - no signals or markers as such - careful consideration of the subject represented in the passage and imaginative consideration of possible implications are necessary.

As noted in the outline, the lesson also contained a trial exercise in English using Twaddell's scheme for "sensible guessing." The scheme, which is shown in outline below, clarified for students the kinds of questions and the kinds of cues they used to guess at the meanings of unfamiliar words.

Questions to Facilitate "Sensible Guessing"

A. Is it a NOUN?
   1. GRAMMATICAL Questions
      (a) Is it singular or plural?
      (b) What adjective modifies it, if any?

        - (c) **What gender is it?**
        - (d) Is it the subject or object of a verb?
    - 2. PRAGMATIC Questions
        - (a) Does it refer to person, things, conditions, events, qualities?
        - (b) How many?
        - (c) What kind?

B. Is it a VERB?

- 1. GRAMMATICAL Questions
    - (a) Does it show future, present, or past?
    - (b) Is it subjunctive?
    - (c) What is its subject?
- 2. PRAGMATIC Questions
    - (a) Does it refer to an action, change, condition, relationship?
    - (b) When?
    - (c) Do people do it?
    - (d) If not, what kind of thing does it?

C. Is it an ADJECTIVE or ADVERB?

- 1. GRAMMATICAL Question
    - (a) Which word in the sentence does it modify, or apply to?
- 2. PRAGMATIC Questions
    - (a) What is it describing in this sentence?
    - (b) Does it describe some fact, or does it indicate somebody's attitude?
    - (c) What kind of fact or attitude? (physical attributes, manner, judgment).

At the second lesson, mimeographed sheets containing the sentences and paragraphs shown in Table 1 were distributed.

TABLE I

FRENCH MATERIALS USED IN SECOND AND THIRD LESSONS ON CONTEXT CLUES

1. Le sommet le plus haut de France se trouve dans les Alpes et s'appelle le Mont Blanc. (A. Definition)

2. La Seine, le fleuve le mieux connu de France, parce qu'elle traverse Paris,... se jette dans la Manche. (C. modifier)

3. Les fleuves de la France sont reliés par une série de canaux. Ces voies d'eau forment un système de communication et de transport qui dessert presque toute la France. (B. Example and E (5) Inférence (situation))

4. C'est un artisan très spécialisé qui crée les articles de luxe pour lesquels la France est renommée. (C. modifier)

5. Quelques articles de luxe exportés dans le monde entier sont : les parfums, les articles de soie et de velours, les dentelles et la porcelaine. (A. Definition)

6. En plus du petit fermier français, l'ouvrier des villes est aussi un autre soutien principal de l'économie française. (B. Example)

7. Des vestiges de la civilisation romaine existent encore en France. Deux villes où l'on peut voir ce qui reste de cette civilisation sont Arles et Nimes. Les arènes de ces villes sont parmi les antiquités romaines les plus remarquables. (E (4) Inference Restatement)

8. Les côtes françaises de la Manche, de l'Atlantique et de la Méditerranée offrent de belles plages aux touristes. (E(5) Inference (not explicit))

9. Le long de la Seine, près de l'Ile de la Cité, se trouvent les étalages des "bouquinistes" marchands de vieux livres et de gravures. (D. 1 appositive)

10. La Seine divise la ville en deux parties, la rive droite et la rive gauche. (C. Modifier)

11. C'est aujourd'hui un musée de réputation mondiale, où, parmi d'autres chefs d'oeuvre, on trouve deux statues de l'antiquité : la Vénus de Milo et la Victoire de Samothrace. (D. 4 Restatement)

12. De la Place de l'Etoile rayonnent douze avenues, ce qui explique le nom donné à cette place. (C. Modifier)

(Table 1 continued)

13. Un quartier intéressant sur la rive droite est Montmartre. Bâti sur une butte, c'est un quartier de contrastes. On y trouve les artistes qui exposent leurs tableaux dans les rues étroites, les touristes qui visitent les "boites de nuit" et les pélerins qui viennent à l'église du Sacré-Coeur. Cette église d'architecture romane avec son dôme bysantin, domine la butte Montmartre. (E. 2 Repetition of key words)

14. C'est la plus vieille école de l'Université de Paris, une institution renommée depuis le Moyen-Age comme étant un centre d'enseignement. (C. modifier)

15. Malgré les guerres et leurs destructions, la Normandie est aujourd'hui une province paisible, un pays de vergers et de pâturages. Les produits principaux sont le beurre, les fromages, et le cidre. (E (5) Inference (relationships))

16. Le mécontentement du peuple s'est répandu, encouragé par les grands écrivains de cette époque, Voltaire, Montesquieu et Rousseau. Ces écrivains ont fait ressortir dans leurs oeuvres les injustices politiques, sociales et religieuses. (C. Modifier)

17. Leurs idées démocratiques se sont propagées en France, en Europe et même en Amérique, où les colons étaient en train de lutter contre l'Angleterre pour obtenir leur indépendance. La France a participé à cette lutte. (B. Example)

18. Recette de l'omelette aux fines herbes.
    1. Prenez six oeufs et un saladier.
    2. Cassez les oeufs dans le saladier.
    (E (5) Inference (relationship))

19. "Un Fou Très Sage" Rabelais

Nous sommes à Paris en 1540. La rôtisserie du petit Chatelet est une grande et belle rôtisserie. Quand vous passez devant, vous sentez des odeurs de poulets, de boeuf en train de rôtir; des odeurs délectables qui font venir l'eau à la bouche. (D. (4) Restatement (semi colon))

20. Devant la rôtisserie, un portefaix mange un morceau de pain. C'est tout son déjeuner, car il est très pauvre. Il mord dans le pain, et en même temps, il hume l'odeur des rôtis. E.t, comme il a de l'imagination, il trouve que son pain, ainsi parfumé, est très savoureux. (E (5) Inference (not explicit))

(Talbe 1 continued)

21. La représentation a lieu dans un brouhaha incroyable. Les classiques sifflent, protestent; les romantiques applaudissent, hurlent leur admiration. (E (5) Inference (not explicit))

22. Il était pauvre, mais il n'était pas malheureux... Il désirait être professeur de philosophie et continua à étudier à l'Université d'Alger. Il faisait toutes sortes de besognes pour pouvoir terminer ses études. (E (5) Inference (relationship))

23. Le printemps venu depuis deux semaines alternait le soleil et les averses. (E (4) Inference Restatement (opposite))

24. Le long kilomètre de la grande rue. Presque la seule rue. Après le canal, elle se divisait en trois artères vers la campagne. (E (5) Inference (relationship))

25. Le Bathyscaphe III de la marine française vient de plonger à plus de quatre mille mètres dans l'Océan Pacifique. Bien qu'on ne connaisse pas les détails de l'opération, il semble que tout se soit passé dans les meilleures conditions possibles et que les renseignements scientifiques recueillis soient encore plus importants que ceux obtenus le mois dernier. (E(5) Inference (relationship))

26. Voici... les prévisions du temps pour la journée de demain : dans la région toulousaine, vent du sud-est modéré avec quelques rafales.. Ailleurs le temps en France sera généralement assez beau, avec possibilité d'averses dans l'après-midi. (E (5) Inference (not explicit)x)

27. La plus longue course de bicyclettes du monde a lieu en France chaque année au début de l'été : c'est le Tour de France. (A. definition)

28. Cette course spectaculaire couvre de quatre à cinq mille kilomètres en une vingtaine d'étapes, dure trois semaines, et attire une trentaine de millions de spectateurs au bord des routes et dans les villes de fin d'étape. (E (5) Inference (not explicit))

29. Cette année il y a quatorze équipes, de France, Italie, Espagne, Allemagne, Angleterre, Hollande, Danemark... et quelques indépendants. (C. Modifier)

30. Le premier, lui, aura gloire et fortune. (E (4) Restatement (same))

(Table 1 continued)

31. S'ils avaient une panne, il leur fallait réparer leur bicyclette eux-mêmes, comme ils pouvaient. (E (5) Inference (situation))

32. Une jeune fille l'embrasse et lui met une guirlande de fleurs au cou. (E (5) Inference (situation))

33. Messieurs, je peux dire que pendant mes 45 ans en mer, j'ai visité tous les pays du monde et j'ai vu pas mal d'exemples de la stupidité des hommes. Mais ce qui est arrivé hier, devant mes yeux, je dois dire que ça dépasse tout. (B. Example)

34. Ah, messieurs, la mer, vous ne savez pas ce que c'est. Elle est traître. Elle n'est jamais aussi dangereuse que quand elle a l'air calme. (E (1) Inference (parallel structure))

35. Dès ce moment il s'entêta, résolu à garder toujours la première place. (C. Modifier)

36. Il était si intelligent, il s'assimilait tout si rapidement. (D. Restatement)

37. Car Joanny Leniot cachait son effort obstiné. S'il se donnait, en étude, une demi-heure de repos, il passait cette demi-heure à montrer à tous son oisiveté, se levant vingt fois de place, se faisant constamment rappeler à l'ordre par le professeur. Il recopiait ses devoirs à la dernière minute. Il dormait même parfois en classe. Tout cela faisait illusion, et l'on était surpris par la rapidité de son esprit. (C. Modifier)

38. J'ai les mains dans un état épouvantable; il ne reste pratiquement plus de peau, le peu qui reste est noir.. (E (4) Inference Restatement)

39. Je suis tour à tour lucide et inconscient. (E (4) Inference Restatement (same))

40. Il me semble que je suis en contact avec la neige par l'intermédiaire de deux objets étrangers durs, raides, des échasses : mes jambes. (D (4) Restatement (colon))

41. Le vent faiblit peu a peu. Avec le jour, il cesse complètement. Chaque mouvement demande un véritable héroïsme. J'essaie désespérément de repousser la masse molle et glacée qui m'étouffe. Ma pensée est engourdie. Nous évitons de parler. (E (5) Inference (situation))

(Table 1 continued)

42. Les mouvements nous essoufflent terriblement. Nous suffoquons. (E (4) Restatement)

43. Du fond du sac de couchage, je tire la caméra. Je la remonte et j'essaie de la faire marcher. Un petit bruit, puis elle s'arrête, bloquée. (E (5) Inference (situation))

44. Je me méfie de ma pensée dont l'activité est très ralentie : je me rends parfaitement compte de l'état déficient de mon intellect. (E (4) Inference Restatement)

45. La marche est épuisante. Chaque pas est une victoire de la volonté. (E (1) Inference Parallel structure)

46. Je suis anxieux. Je suis responsable des autres : je dois penser et prévoir pour eux. (D. Restatement)

47. Le glacier de la Faucille, baigné de lumière, est entièrement découvert à nos yeux. (E (5) Inference (situation))

48. J'ai froid aux pieds.. sans arrêt, je fais fonctionner mes orteils, même en marchant. (E5 Inference (situation))

49. Avec la neige qui brille au soleil et saupoudre le moindre rocher, le spectacle est d'une radieuse beauté qui me touche infiniment. La transparence absolue est inhabituelle. (E Inference (1) parallel structure and (5) situation)

50. Heureusement la neige est dure. En frappant avec les pieds et grâce aux crampons, nous nous maintenons suffisamment. Un faux mouvement serait fatal. Inutile de creuser des prises pour les mains : le piolet enfonce assez loin. (C. Modifier and D.4 Restatement)

51. Les précipices de l'autre côté sont insondables, terrifiants. (C. Modifier)

52. Il faut qu'il me chausse, qu'il m'équipe entièrement. (E (4) Inference (restatement))

53. Le vent cesse complètement, mais la neige tombe à gros flocons. (C. Modifier)

54. Sommes-nous trop haut, trop bas ? On ne peut pas savoir. Obliquons sur la gauche. (E 5 Inference (Relationship))

55. Chaque fois nous croyons reconnaître le bon passage. Toujours c'est la même désillusion. (E (4) Inference Restatement (opposite))

(Table 1 continued)

56. J'admire cet *entêtement* de Rebuffat. Il ne veut pas mourir. Avec une obstination incroyable, au prix d'efforts désespérés, il avance. (E (5) Inference (situation))

57. Lachenal se met à crier, mais le son semble *buter* à quelques mètres. La neige absorbe les bruits. (E (5) Inference (situation))

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These materials had been selected from a variety of sources of reading texts means for slightly more advanced students. They were designed to illustrate the operation of specific types of context cues as classified by Deighton. The types of items were presented in random order of the sheets. (But their designations in Deighton's scheme are noted in the Table). Thus, rather than requiring students simply to sort the examples according to a predetermined scheme with labeled headings, they were required to discover the generalizations. The outline for the second lesson follows.

Context Cues - Lesson Two

Outline

1. Discuss (and have restated by class) the "narrowing down" process in inferring meaning of an unfamiliar word.
2. Review and define the types of cues:
    a) grammatical - (intra-lingual)
    b) word analyses - (intra and inter-lingual)
    c) context-meaning - (extra-lingual)
3. Review the notion of "temporary meaning," to be confirmed, revised, or discarded as might be later required by the reading passage or later word.
4. Distribute mimeographed sheets of items in French showing primarily the operation of context cues.
5. Proceed through examination of these items as time allows, eliciting both meanings and precise descriptions by the class of how context revealed the meaning. (Note that translation is not the aim of the exercise).
6. Begin to refer to formal types of context cues (according to the modified Deighton scheme) as repetitions begin to occur, writing names of terms on the board:

Definition
Example
Restatement
Modifiers
Parallel Structures
Key Words
Conjunctions
Inference

7. Point out the range of inferences from simple ones with mechanical signal words or devices to those where only careful reading and intelligent thinking about context provide the cues. Note that "cultural overlap" makes a big difference in how easy this latter type is: that is, the degree of familiarity with the reality represented.

Finally, the third lesson continued the exercises begun in the second lesson and provided a recapitulation. The outline follows.

Context Cues -- Lesson Three

Outline

1. Review kinds of context cues (Deighton scheme) discussed in previous class.
2. Continue discussing examples on mimeographed sheets, and adding the other heading of the Deighton outline. (Give background information on various texts where needed, calling attention again to the aid given by familiar situations).
3. (If time permites) refer to sheets of reading comprehension study for additional examples.

Some Didactic Test Devices

Two testing procedures used in the project seemed to exhibit considerable didactic power and should be mentioned, therefore, in this chapter.

The first was the use of "cloze" procedures where words are deleted from a sample of text and respondents are required to replace them. Two such passages in English were administered in the project. They are shown in Appendix B. In addition to filling the blanks, pupils in several classes were asked to write a short paragraph describing how they proceeded. A very large proportion of these paragraphs revealed that students had become aware of the efficacy of scanning prior and subsequent context. The scores yielded by this test were also used in the final evaluation.

The second testing procedure that seemed to be of didactic value was the Visual Inference Test. The procedure, role of this test in the project and some findings are described in detail in Chapter IX.

Materials for Teacher Use

A classification of definitions developed by Scherer and Wertheimer (1964) was provided to teachers to be used as a guide for providing cues in their classes. Analysis of classroom protocols revealed that teachers apparently felt these materials to be useful (see Chapter VI). The list of types of definitions, together with examples chosen by the project staff are shown below.

Types of Definitions -- Aids for Inference

1. SYNONYM
   un navire : un bateau
   véritable : vrai
   souvent : beaucoup de fois

2. ANTONYM
   derrière est le contraire de "devant"
   large est le contraire de "étroit"
   la campagne : ce qui n'est pas la ville

3. DEFINITION
   un breton : quelqu'un qui habite la Bretagne (also derivation)
   résoudre : trouver une solution à
   un remorqueur : un petit bateau qui aide un grand bateau à entrer dans un port.
   un chat : un petit animal qui aime le lait.

4. INSTRUMENT
   les yeux : on voit avec les yeux
   écouter : on écoute avec les oreilles

5. Purpose
   tissu : on fait des robes en tissu
   un lit : on dort dans un lit

6. EXPANSION
en arrivant : quand nous arrivons.

7. DERIVATION
travail : quand on travaille, on fait du travail
joyeuse : est l'adjectif qui va avec joie

8. ENUMERATION
une semaine : une semaine a sept jours
une douzaine : douze

9. EQUATION
a) phrase : chez moi : dans ma maison, ou dans ma chambre

b) sentence manquer : il me manque du pain - je n'ai pas de pain
pas du tout : il ne mange jamais de salade; il ne l'aime pas du tout.

10. INFERENCE
a) by association :
un tableau : "la Joconde" (Mona Lisa) est un tableau de Léonard da Vinci
une langue : l'anglais est la langue que les Américains parlent.

b) [illegible] :
emporter : l'après-midi, j'apporte mes livres chez moi; le matin, je les emporte avec moi à l'école.

c) by location :
le volant : quand on conduit une voiture, on a ses mains sur le volant, ou au volant.

d) by situation :
couvert : en hiver les montagnes sont couvertes de neige.

e) by condition :
triste : quelqu'un qui a reçu de mauvaises nouvelles est triste.
avoir faim : quand on n'a pas mangé, on a faim
glissante : s'il y a de l'eau dans la rue, elle est glissante et on peut tomber.

f) by example :
une vedette : Elizabeth Taylor et Brigitte Bardot sont des vedettes de cinéma
un légume : les carottes et les choux sont des légumes

The four lessons and the test and teaching materials described in this chapter comprised, in essence, the extent of formal training in inferencing. The remainder of the training was accomplished by the teachers and was superimposed on the daily curriculum. The following chapter describes other materials that were planned but not administered at the schools.

Chapter VIII

ADDITIONAL MATERIALS AND PROCEDURES ON THE INFERENCEABILITY OF FRENCH

This chapter sketches three kinds of classroom materials and procedures. First, it lists some kinds of lessons and procedures that have been suggested but never completely worked out for presentation. Second, it presents some materials that were developed too late for classroom administration. Finally, it outlines a sub-project for developing materials which was begun but which expanded beyond the scope of the project and was not completed.

Some Lessons and Procedures

1. Practice with "expanding contexts." In the "expanding contexts" procedure, the teacher presents a French word that may or may not be a cognate of an English one, or an expression may be presented. The word or expression is presented without context. Students are asked to make a guess at the meaning of the word or expression or better, perhaps, to use it in a sentence[5]. After responding, the student makes a "certainty rating" for his responses, on a scale running from one to five indicating how confident he feels about

Next, the teacher presents the word again embodied among some cues. These cues may be a sentence fragment surrounding the word, a complete sentence, or a sentence containing the kinds of context cues analyzed in the preceding chapter. The student again indicates his guess as to the meaning of the word or uses it in a French sentence. Again he indicates his sense of certainty. If the response is a sentence, it is most useful if it is a definitional one. Thus, students should be required to make their sentences as close to definitional as the word permits. The procedure may be repeated a number of times allowing the cues to accumulate and encouraging students to make adjustments to the expanding contexts.

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[5] Students' responses might be prepared in writing as though the procedure were a test. Writing would insure the teacher that all students receive the benefit of the exercise and would provide the teacher with a written record for later evaluation and diagnosis. Oral procedures, however, would proceed more quickly, but usually they give practice only to the best inferencers in the class.

This procedure closely parallels the procedure for the Visual Inference Test described in Chapter IX. It also has some of the elements of the test procedure described in Chapter X for evaluating the "context cues" lessons. It could be used to achieve the following objectives:

a) To indicate to students that high certainty in inference making is justified only where there is a comparatively large number of concurring cues;

b) To provide experience dealing with the dilemma generated by discordant cues;

c) To provide practice in locating the kinds of cues described in the proceding chapter;

d) To illustrate the findings of some of the research on "cloze procedure" (where respondents are required to replace words deleted from running text), namely that (a) immediate context is usually important for inferencing about "function words" and that (b) remote context usually provides the cues for "context words."

principles inductively and might serve as a bridge to developing inquiring procedures.

2. Practice in following instructions. In this procedure students would be given a single task, a manual one, such as assembling a mechanical pencil that had been manufactured in France. The accompanying French instructions would be provided. Students would be required to execute the task using the instructions as much as possible. (Even in one's native language one must also use some understanding of the task and some ingenuity in following written instructions.) After completing the manipulation, students would prepare a French glossary of the objects dealt with and the actions performed.

This procedure would be useful in illustrating:

a) That understanding can proceed without knowing each word;
b) The value of pragmatic context cues; and
c) The possibilities of using the descriptive function of language for conducting linguistic inquiry.

Establishing the habit of preparing a glossary of new words learned in pragmatic contexts is expected to facilitate markedly language learning outside of the classroom by maximizing the gains to be made from focused inferencing.

3. The use of familiar textual materials. Extensive use of materials that do already frequently filter into the foreign language classroom is recommended for the inference method. A page of a highly illustrated "slick" magazine has excellent possibilities for a procedure similar to the one described under "practice in following instruction." Familiar stories read infinitely easier than new ones. But the benefit of the inference method is to be derived only if the inferences are focused upon and analysed.

4. "Required Inferencing." It is often the case that to good inference-making are the ones who do most of the responding in a class. A teacher can easily proceed in presentations incorporating the elicitation of inferences and yet not involve those students who need most to learn how to make them. A past history of poor responses, incorrect answers, and corresponding disapproval is likely to push into passivity precisely those students the present study was really designed to help.

A possible way of breaking this pattern might be to build "required" inferencing into a course in the following manner. At regular intervals in the course of a lesson, each student is asked to write his answer to the teacher's question (requiring an inference). As the lesson proceeds and more cues are given, the students answer again and again. Instructions at the outset indicate that credit will be given for the earliest correct answers, and that each paper will be graded, with no penalties for incorrect answers. This procedure would, at least, provide an improved sample of class learning. It is also intended to focus attention on the steps leading to correct inferences.

Some Materials Providing Inference Cues

Inference of word meaning is obviously more or less difficult depending on the degree of relationship or overlap between the source and the target languages. The possibilities for reasonable guessing naturally increase greatly when the learner's language and the target language share semantic categories, phonemic distinctions, grammatical devices, and morphological items. Vocabulary similarities stemming from common or intertwined linguistic heritages are particularly useful.

In the case of a native speaker of English learning French, it was clear that some attention to the nature of French affixes and their relationship to the English system, and to other French-English correspondences would improve his inferencing.

Many of the French affixes have similar equivalent English forms, and their meanings are easily acquired. Moreover, the knowledge of English with Greek or Latin roots (whether or not the semantic cues which the meaning of the affix can then narrow down.

Known phonetic correspondences (see the following section) and their written forms provide additional aid to the inferencer. With this in mind, a set of materials dealing with these word-analysis cues for inference, both intra-lingual and extra-lingual, was planned but not presented in experimental classrooms.

The intra-lingual cues to be provided would be derivational prefixes, suffixes (including verb infixes) and inflectional affixes as markers of form classes. Inter-lingual cues would include accent marks indicating known probable letter correspondences between French and English and other historically established phonetic correspondences. Some information of the latter type was already included in the French texts used by all classes and was simply organized and rearranged for easy presentation in lesson form. A table of principal phonetic correspondences was taken from the Larousse Dictionnaire des Racines des Langues Européennes (Larousse, 1948).

Tables of frequency and reliability of French affixes based on exhaustive study of Frency frequency lists and texts could not be established within the scope of this study. The aim, therefore, was to provide at least some specific information on French affixes and "combining forms" classified by types and meanings, with annotations of English parallel forms, if these existed.

To this end, a preliminary complete list of French affixes and combining forms with English equivalents or meanings was taken from Hall's(1948)structural sketch of French. Additional affix lists were compiled from standard French dictionaries. (Larousse, 1948). These lists were cross-checked with Hall, and the results were compared with Deighton's (1959) word-analysis scheme. Deighton had determined six categories for English "practical word-analysis" as follows:

1. Useful combining forms with fixed meaning. Twenty-six items are the key to more than 200 English words, largely all also used in French. Examples: "anthropo-," "heter-," [illegible] "pan-."

2. Prefixes with invariant meaning. Eleven items are the key to 1,950 English words, most of which have close French counterparts. Examples:

English	French
"intra-"	"intra-"
"mis-"	"mé-"
"sy-"	"sy-"
"syl-"	"syl-"
"sym-"	"sym-"
"syn-"	"syn-"

3. Helpful noun suffixes. a) Eight markers of abstract nouns ("having the quality of"), seven of which have French counterparts. Examples:

English	French
"-ance"	"-ance"
"-ism"	"-isme"

b) Six markers of nouns without cues to content. Four of these also occur in French. Examples:

"-acity"	"-acité"
"-ness"	"-esse."

4. Noun endings with invariant meaning. a) Eight items indicating "agent," five of which are similar to French. Examples:

"-grapher"	"-graphe"
"-ist"	"-iste"

b) Six items indicating diminutives, two of which are similar to French. (French has a number of others.)

c) Two items indicating "pertaining to" and "place for" -- both are found also in French. Examples:

"-osity"	"-sité"

d) Twenty-four items of invariant meanings in common usage. Examples:

"-cide"	"-cide"
"-metry"	"-métrie".

5. Adjective endings with invariant meaning. a) Seventeen items of invariant meaning in common usage, six of which are found in French. Examples:

"-fic"	"-fique"
"-able"	"-able"
"-genous"	"-gène"

b) Four items meaning "abounding in, full of." Three of these occur also in French. Examples:

English	French
"-ous"	"-eux"
"-ose"	"-ose"
"-acious"	"-acieux"

c) Five items indicating various degrees of connection or likeness, all with close French counterparts. Examples:

"-ive"	"-if"
"-ish"	"-ique"

Thus, it may be seen that the comparison of French lists against the Deighton data provided a number of items which operate similarly in French and English to reveal word meaning in a relatively large number of cases. The English items have established frequencies and reliabilities; the French counterparts, of course, do not. However, if one knows a stable meaning for an English prefix and a close French equivalent exists, one should not neglect the possibility of making an inference as to French meaning on the basis of that correspondence.

It was, therefore, felt that information of this nature should be provided in lessons as interim aids to inference.

The lists of French affixes were also sorted separately by categories of meaning (diminutive, pejorative, collective, etc.) to serve as the basis for lessons.

While these materials were completed too late for inclusion in lessons given by Project staff, they were, however, made available as supplementary materials for teachers, who were encouraged to incorporate similar work in class lessons wherever possible.

French as an Ecology for Inference: A Problem and a Sub-Project

To what extent is French a favorable ecology for inferencing? Those teachers, text writers, and test makers who are very concerned about "false friends" and poor-correspondences among the meanings of some cognates seem to imply that the inferenceability of French is more apparent than real. The position of some of the writers of some of the newer curricula is the opposite. The matter could be solved by means of a quantitative study.

Such a study would specify the correspondences between English and French and determine how frequently these correspondences yield valid inferences and how frequently they are likely to lead one astray. For example, French /p/ frequently corresponds to English /p/, e.i., possibilité - "possibility." Sometimes French /p/ corresponds to English /f/, pere - "father." The reasons for these correspondences are a matter of the history of the languages. Synchronically speaking, however, the question is: How frequently does French /p/ exhibit no correspondence with a sound or letter in the English word; how frequently does it correspond to /p/, and how frequently does it correspond to /f/? Further, how many of each kind of the correspondences are perfect, how many are close, how many, at best, merely specify the semantic field; and how many correspondences are merely a matter of remote etymology that might be useful only as mnemonics and valueless to the inferencer?

The product of a completed study of this nature, worked out for a substantial fragment of the dictionaries of the two languages, would be adequate to settle the argument as to extent of the inferenceability of French. The study might also be based on various kinds of text, thus adjusting the probability statements that can emerge as to the relative frequencies of each of the words. From such data we could predict the degree of success of an inferencer (whose English vocabulary is known) in comprehending a specific kind of text, if he based his inferences merely on internal cues and ignored context cues. These data would serve as a base line from which inferencing could be improved by other kinds of cues and by cross-checking.

The usefulness of the product of what would be a massive research undertaking goes beyond the mere settling of an argument. The data could be made into a very useful tool for the inferencer. With a table of letters and/or phonemes of inter-lingual correspondences and data as to the reliability and relative frequency of the operation of these correspondences, the inferencer can attempt to establish lexical correspondences in a systematic manner. He would attempt the most likely substitutions first. (Let the term substitution pertain also to replacing French /p/ with English /p/.) This would provide him either with a very likely cognate, a synthetic word that might suggest another word, or some useless nonsense. In the last instance, the inferencer might substitute the next most likely letter or phoneme in the table and examine the product. If no likely lexical item occurred, the process would continue until all the possible substitutions were attempted. If still no correspondence were found, the process would be terminated. Such a table would also include the relative frequency of such linguistic change phenomena as metathesis and appenthesis and their likely loci.

Not only would the table of correspondences supply the inferencer with concrete suggestions for making derivations, the probability data would also supply him with the data necessary for judging how likely it is that his inference is correct. Since the table could include the data on the relative frequency of lexical correspondences, the inferencer could even make a judgment as to whether his failure to find a correspondence was a likely occurrence.

For this reason, the project attempted the preparation of a table along the lines suggested. Some rudimentary materials were developed, but turnover among the staff members competent to undertake the task made it impossible to complete this sub-project.

In the process of attempting to develop such a table, it became apparent that as the linguistic corpus used became larger, the data in the table would become more complete and reliable. Consideration was, therefore, given to formulating the problem for analysis by high speed electronic computer. Correspondence and informal consultation was initiated with Dr. Gary Carlson, University of Utah, Dr. Sally Yeates Sedelow, St. Louis University, Dr. Paul Garvin, Bunker-Rama Corporation, Dr. George Monroe, Lafayette College and Dr. H. Hood Roberts at the Center for Applied

Linguistics.[6] Consensus among these researchers experienced in computer linguistics was that the project was possible. Some provided suggestions and approaches generated by their own work.

Despite the fact that the preparation of the table would constitute a relatively major undertaking in itself and was beyond the scope of the present project, it is felt that the inference method is incompletely developed without it. It is hoped that such a table will be produced in the future.

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6. Dr. Roberts provided some very detailed suggestions and generously offered the use of appropriate raw data he had collected if the project were to be undertaken.

Chapter IX

PRELIMINARY FINDINGS ON A TEST OF INFERENCING BEHAVIOR

This chapter is devoted to a discussion of an attempt at measuring individual variations in making inferences.

Objectives

A possible first step for validating the role of inference in foreign language learning might consist of developing instruments that would measure individual differences in the components of inference-making and correlating these with foreign language achievement. This strategy was rejected for the present study since a high correlation would merely suggest that inferencing plays a role in language learning and would not obviate other implications of the correlation or other possible explanations of the relationship. Further, since many school methods of foreign language instruction are largely antithetical to inferencing, it is not likely that foreign language achievement measured in an indiscriminate sample of schools would exhibit any relation to inferencing, even if there were a demonstrable relation between inferencing and foreign language achievement. The magnitude of the correlation should depend on the degree to which the instruction encouraged -- or did not discourage -- inferencing. The task of identifying settings that encouraged or inhibited inference cannot be avoided.

In the present study it was anticipated that the experimental manipulation and the presence of control groups would provide adequate identification of settings. A test of inference-making would be useful, therefore, in cross-validating the effectiveness of the "method of inference." If the method implemented by the experimental teachers was effective and did, in fact, encourage inferencing; and if the inference test does, in fact, measure inference; then the correlation between achievement and inferencing may be expected to be higher in the experimental groups than in the control groups. This cross-validation was not achieved in this project. While the test reported here seems to promise a valid measure of inference behavior, development did not progress far enough nor was the identification of settings deemed to be wholly adequate.

There were several other very compelling reasons for attempting to develop a test to measure individual differences in inferencing in addition to providing a rigorous cross-check for the present study. A general technology of inference in education requires answers to a number of questions,and such a test may help to supply these answers. These questions relate to the development of cognitive functions and certain personality functions, and ramify into many of the relations between psychology and the educational process. These questions carry specific implications, beyond foreign language study, to all the curriculum areas which may involve inference.

The list of questions follows:

(a) What is the nature of the development of the ability to make inferences? When do children begin to recognize the relevance of additional information for identifying ambiguous stimuli? When do they begin to be able to adjust appropriately to cues that are divergent or concurring?

(b) What is the nature of inter-individual variations in inferencing? What are the variations in competence and rationality of the inference process? Are there personality variations, such as excessive timidity or unwarranted recklessness, that would render unfeasible for certain individuals training to use inference as a cognitive strategy for coping with curricula?

(c) Is concomitant training possible that would modify personal traits that are detrimental to the effective use of inference? Is it possible to measure variations in inferencing within individuals that may occur as a consequence of development or training procedures intended to modify their inference strategies?

In general, a test of inference-making is desired that would serve as a prognostic and diagnostic device in school settings and would serve as a yardstick in developmental and experimental studies of the inference process. Of course, the development of a reliable, valid, and adequately normed instrument extends beyond the scope of a project concerned essentially with a modification of instructional procedures in a single subject matter area. Certainly the more profound general questions about the inference process that might be explored with a sophisticated instrument are matters for related research projects, but are entirely different from the present project.

Yet in a project on inference in foreign language study, a measurement of at least fragments of the inference process seemed essential. The allocation of some of the energies of the project to the development of a test of inferencing seemed justified. Hindsight suggests that the availability of a well-developed, sophisticated measure of inference-making ability prior to the inception of the present project would have been extremely advantageous, but the original conception of the research reported here occluded foresight of this realization. In terms of its conception, it was inevitable that only parts of the research on a test for making inferences are available to be reported here. The parts, however, proved useful indeed in helping our understanding of the inference process as it occurred in our project on foreign language study.

The Process to be Measured

Inferencing is a complex process. The possibilities for inferencing and the probabilities of making correct inferences are essentially determined by characteristics of the stimulus field. Given an ecology conducive to inferencing, however, it is the individual who must have certain capabilities. The task of measurement is the assessment of these capabilities.

To be a successful inferencer an individual must first be able to scan his environment and recognize familiar components. There are variations in the ability and techniques for scanning the environment, associated, perhaps with what we are accustomed to calling alertness. Further, it is known that recognition does not function equally well in all individuals, nor is it perfectly constant within an individual -- particularly in certain pathologic states. Yet scanning and recognition are so elementary as cognitive processes that they are not believed to contribute very substantially to measurable differences among individuals in respect to their ability to make inferences. For preliminary studies, tests that seem to measure scanning and recognition may be from existing batteries.

The larger the number of familiar components a stimulus provides, the fewer are the inferences that remain to be made and the greater are the probabilities for making correct inferences. Thus knowledge of the characteristics of a given stimulus field may be expected to contribute substantially to the ability to make inferences. Indeed, familiarity with a stimulus field may make one man's recognition indistinguishable from another's inference. In any specified subject matter area, tests of knowledge may be employed to measure the contribution to inferencing that originates with familiarity -- if the tests are successful in measuring only knowledge. In our attempts to arrive at a general measure of inference-making ability, we have tried to obviate the contribution of knowledge or familiarity in the measurements by attempting to contrive items that would keep this factor constant.

The next component of the inference process seems to be the subjective assessment of the probability that a given inference is correct. Behaviorally this assessment is expected to be manifested by the latency, or readiness, with which inferences occur, and seems to be readily measurable. Competence in making assessments may be measured by relating the latency of inferences to their appropriateness. Or respondents may be provided directly with an opportunity to supply assessments of their subjective sense of certainty.

Yet it is not the subjective assessment of the correctness of an inference alone that determines how soon an inference will be manifested. Individuals may be expected to vary in what might be called their "cognitive courage." Some are more daring than others. Some are less concerned with being wrong than others. It is important to attempt to scale the relative standing of individuals in respect to their cognitive courage, since measures of such a trait, if it is consistent within individuals, would be highly predictive of their behavior in a variety of situations. It is to be noted, however, that competence in making assessments of the probability that a given inference is correct must be adjusted for each individual to his general level of cognitive courage, or level of willingness to make inferences.

Eagerness for rewards and dread of punishment, or responsiveness to what has been called the "pay-off matrix" in research on decision making (see Chapter I), are factors that may be expected to affect the latency of inferencing. There is no reason, at present, to assume that these factors will affect all individuals equally. The effect of these factors can be ascertained, however, by measuring intra-individual deviations from their general level of cognitive courage in the presence of a variety of pay-off matrices. Comparison of intra-individual variations among individuals might provide for the scaling of responsiveness to the pay-off matrix for samples of individuals.

Finally, the analysis of the inference process developed here includes a step of verification and validation of tentative inferences. This step may occur and reoccur as repeated scanning of the environment occurs and as additional evidence becomes available. Measurements of the individual adjustment and responsiveness to confirming and invalidating fragments of evidence complete the list of desired measures of components of the inference process.

Procedure

A procedure was devised that would provide for the measurement of the various components of the inference process enumerated above. The procedure required inferencing in the visual mode which was intended to be as closely analogous to linguistic inferencing as possible in respect to the process but not in respect to content. A pre-test on a sample population, not participating in the project, provided an opportunity for refining this procedure and for the development of improved items. Yet the last possible date for testing the experimental and control samples of the project arrived before the instrument was entirely polished. It was deemed advisable to use what might be called a "prototype" instrument to obtain as much information as possible. The decision proved well-advised for the present project. The perfection of the test, however, remains a task for a subsequent project.

The test procedure, which was conducted using standard instructions administered entirely by tape-recorder, began by presenting a small fragment of a larger picture on a screen.[7] This fragment, called a target, might consist of a reasonably familiar object such as a gun-barrel, the bell of a physician's stethoscope, antlers on a stag, the net under the rim of the goal of a basketball game, the scoop of a cooking spoon, etc. Given the masking which showed the target without any context whatsoever, and given the loss of optical resolution in using photo-lithographed magazine materials that were converted to cellulose slides for use on an overhead projector, the targets were, for the most part, totally unrecognizable upon first presentation. For all intents and purposes the targets comprised novel stimuli.

After familiarization on a sample item, respondents were regularly allowed 10 seconds to record their notion of what the target was and to indicate their sense of certainty on a five-point scale. Respondents recorded their answers opposite "Clue 0" for the appropriate item on the answer sheets. A sample page of the answer sheet is shown on the following page (see Figure 5).[8] Respondents were instructed to mark their sheets with a cross if they chose not to attempt an inference and they were told that their certainty rating would automatically be considered zero if they did so. At a signal from the recorder an additional fragment of the same picture was exposed. The fragment, designated as "Clue 1", was selected to supply some information as to what the target might be. In the case of the item containing the gun-barrel, a cowboy's scarf was exposed. The stethoscope item revealed a nurse's cap. The antlers of the stag were now accompanied by a fragment of a forest. A sneakered foot jumping from a gym floor accompanied the basketball net. The cooking spoon was hinted

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[7] The preparation of stimulus materials in the form of slides rather than in the form of a test booklet was deemed advisable at this stage as the slides provided for considerable flexibility for revising items before locking them into final form.

[8] Planned refinements of the response sheet include: (a) recording of certainty ratings and scorers' evaluations of the correctness of responses in a form that can be processed by optical scanner; and (b) obviating the possibility of viewing previous responses while making later ones.

FIGURE 5

Sample of Response Sheet for Visual Inference Test

Initials__________

Clue No.	Name of Target	Certainty Thermometer Very Sure				Very Doubtful	Leave Blank

ITEM I

0	____________________	5	4	3	2	1	__________
1	____________________	5	4	3	2	1	__________
2	____________________	5	4	3	2	1	__________
3	____________________	5	4	3	2	1	__________
4	____________________	5	4	3	2	1	__________
5	____________________	5	4	3	2	1	__________

ITEM II

0	____________________	5	4	3	2	1	__________
1	____________________	5	4	3	2	1	__________
2	____________________	5	4	3	2	1	__________
3	____________________	5	4	3	2	1	__________
4	____________________	5	4	3	2	1	__________
5	____________________	5	4	3	2	1	__________

ITEM III

0	____________________	5	4	3	2	1	__________
1	____________________	5	4	3	2	1	__________
2	____________________	5	4	3	2	1	__________
3	____________________	5	4	3	2	1	__________
4	____________________	5	4	3	2	1	__________
5	____________________	5	4	3	2	1	__________

at by showing a stove burner. Upon presentation of Clue 1, respondents were allowed 10 seconds to record their newest inference of the target and their most recent certainty rating.[9]

The procedure was repeated providing five clues for the identification of each target. In the administrations reported on here, respondents worked on one item at a time, accumulating the clues from 1 through 5. Experiments are envisaged in which all the items are responded to at Clue 0 before Clue 1, and at Clue 1 before Clue 2, etc. This procedure may enhance greater flexibility and adjustment to new information. Other procedures in which clues replace each other, rather than accumulate, may be expected to reduce the certainty of respondents as items reveal themselves less clearly and as the items tax the memory of the respondent more. This procedure might provide an opportunity to study adjustments of objective certainty to greater cognitive stress.

In the present study a rudimentary attempt was also made to measure the effect on response patterns of manipulations of the pay-off matrix. For some items, respondents were told that their scores would be comprised of the sum of positive values given for their certainty ratings when their responses were correct and negative values given for the certainty ratings when their responses were incorrect. The results of this manipulation will not be reported, however. In the classes that were to provide control data on the same items administered under the normal procedure, variations in the administration of the test rendered the validity of these data questionable.

In all, 30 items were prepared for administration. Variations in lengths of class periods, occasional mishaps with equipment, altered bell schedules, etc., made it impossible to administer all items to all groups. A policy was followed of administering as many items as possible in each class. In the data analysis, it was necessary to truncate some test lengths and to use various groups of data in order to obtain the maximum numbers of individuals responding to a maximum number of items, while meeting requirements for equal test lengths and constant test procedures when they occurred. The samples were drawn from the population of students participating in the Project which are described in some detail in the following chapter (Chapter X).

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[9] In the pre-test procedure, respondents were required to identify the clue as well as the targets. This provided information as to the identifiability of clues and made it possible to weed out, for the most part, clues which could not be informative because they were unidentifiable. It is interesting to note that since the identifiability of some clues follows the same rules of identifiability of targets, clues could sometimes be made identifiable and informative merely by rearranging their sequence.

Data Processing, Analysis, and Results

Each clue in each item was scored "Right," "Wrong," or "Omitted," with considerable lenience for spelling and peculiarities in nomenclature. The coded responses were punched onto IBM data cards together with their accompanying certainty ratings. Thereafter, all scoring of individual response patterns and the general data analyses were accomplished by means of high-speed electronic computers.

Response Patterns in Respect to Items

Figure 6 below illustrates response patterns of 101 individuals[10] for 21 items. The lower histogram in each of the illustrations represents the number of correct responses at each clue. The numbers of "Wrongs" at each clue are represented by inverted histograms with their zero points at the top of the illustrations. The blank area between the two histograms, therefore, represents the number of "Omit" responses at each clue.

Examination of the entire set of illustrations permits the generalization that the number of "Omit" responses decreased as the number of clues accumulated. This was expected, since the probability of a correct inference increases as the number of clues increases.

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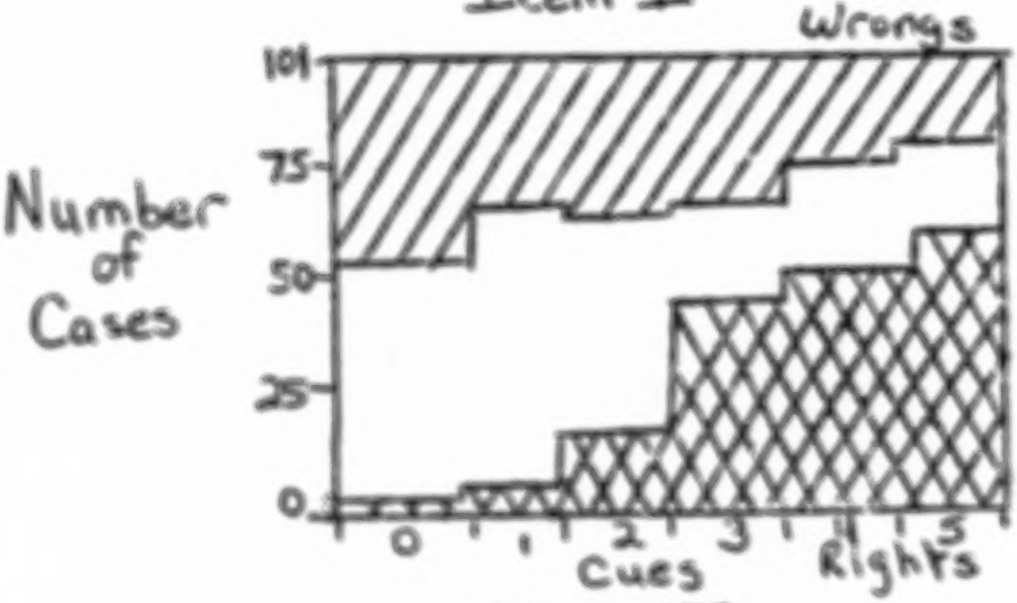
[10] Since approximately 100 cases were used as a sample for this analysis, each case may be said to represent a percentage point. The effect of the extra case, which was inadvertently included in the automated procedure, is negligible in respect to remarks made in the ensuing discussion.

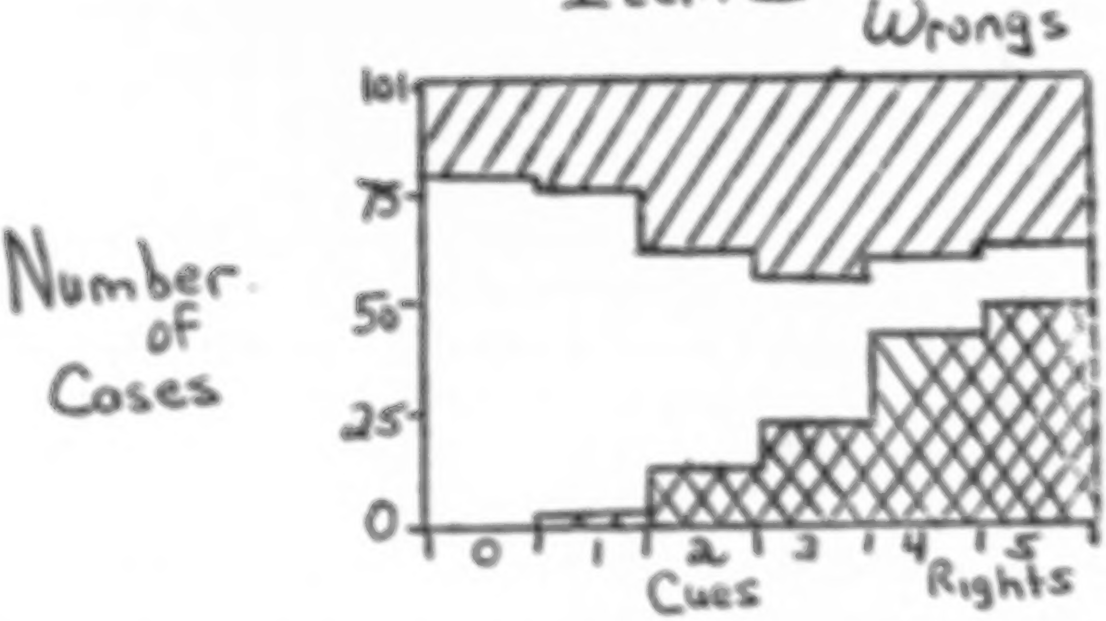
FIGURE 6

Histograms for Right, Wrong and Omitted Responses on Twenty-One Items of the Visual Inference Test N = 101

Item I



Item II



Item III

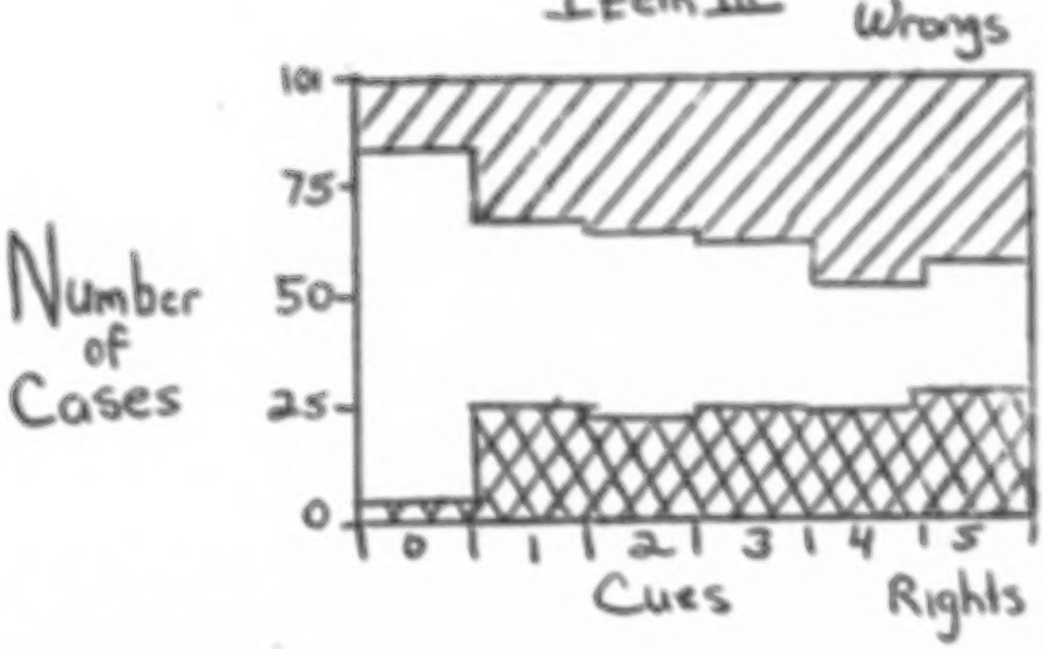
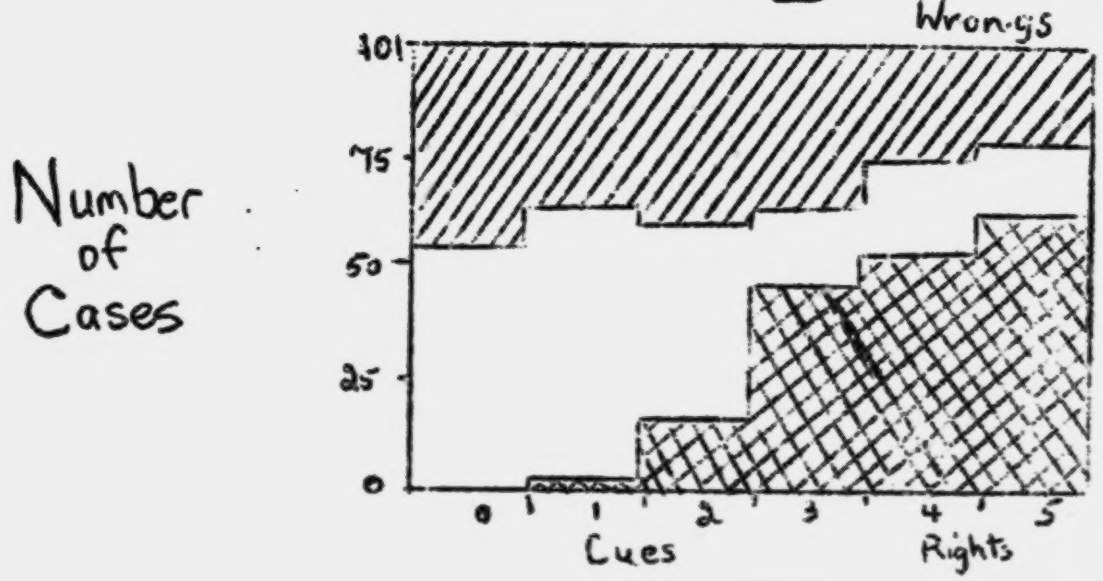
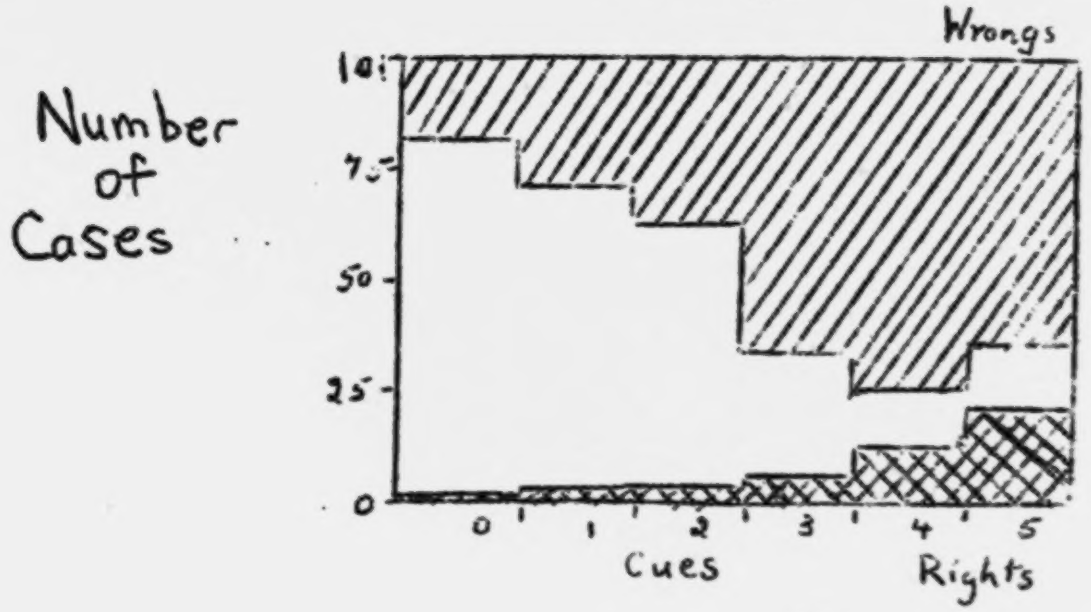


FIGURE 6 (Cont'd.)

Item IV



Item V



Item VI

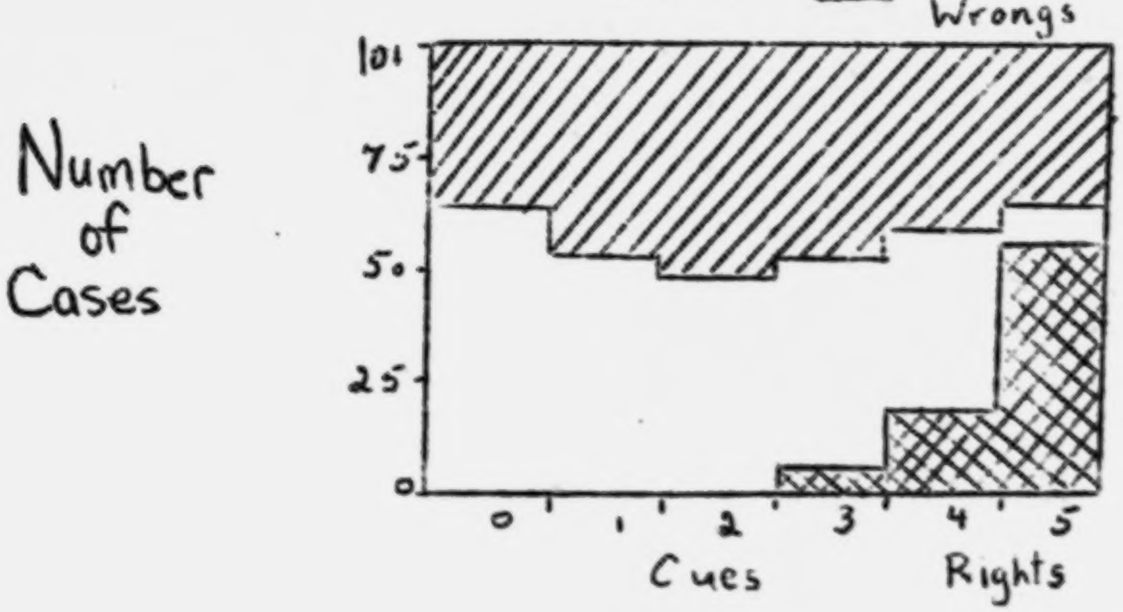
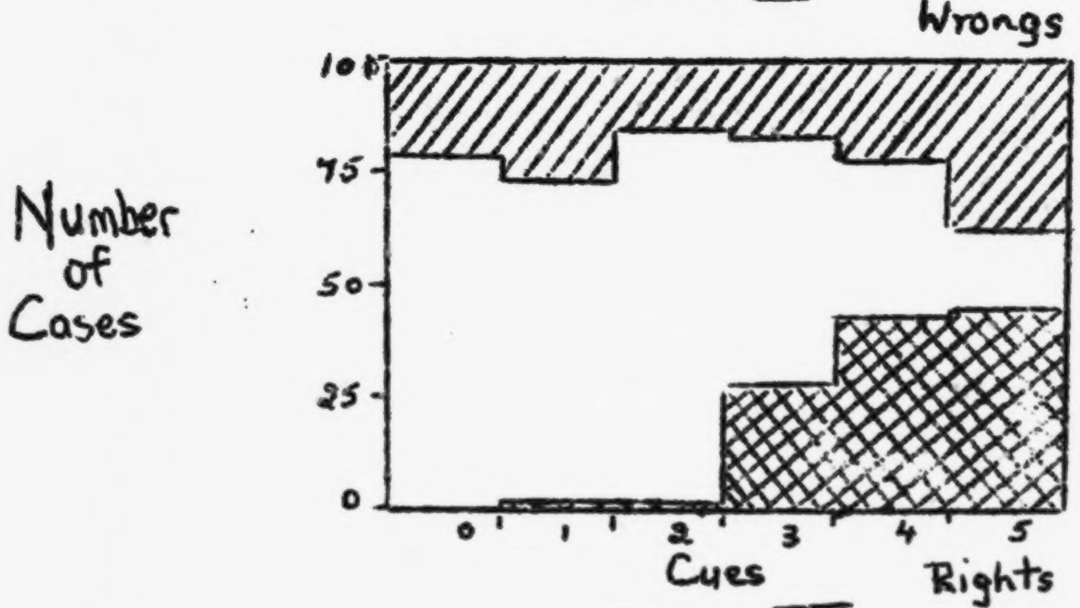
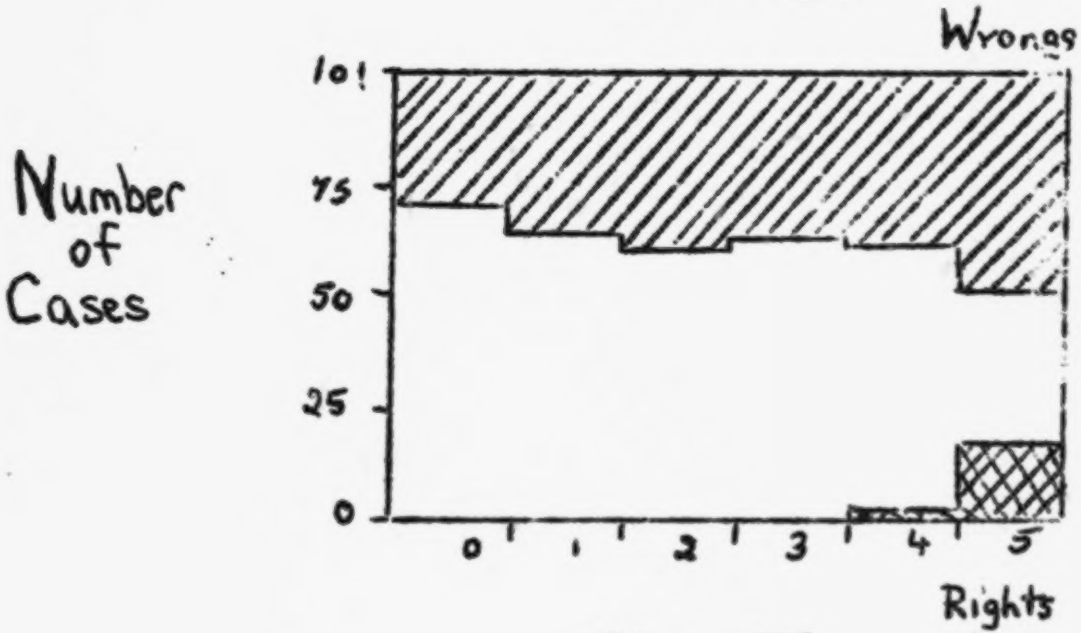


FIGURE 6 (Cont'd.)

Item VII



Item VIII



Item IX

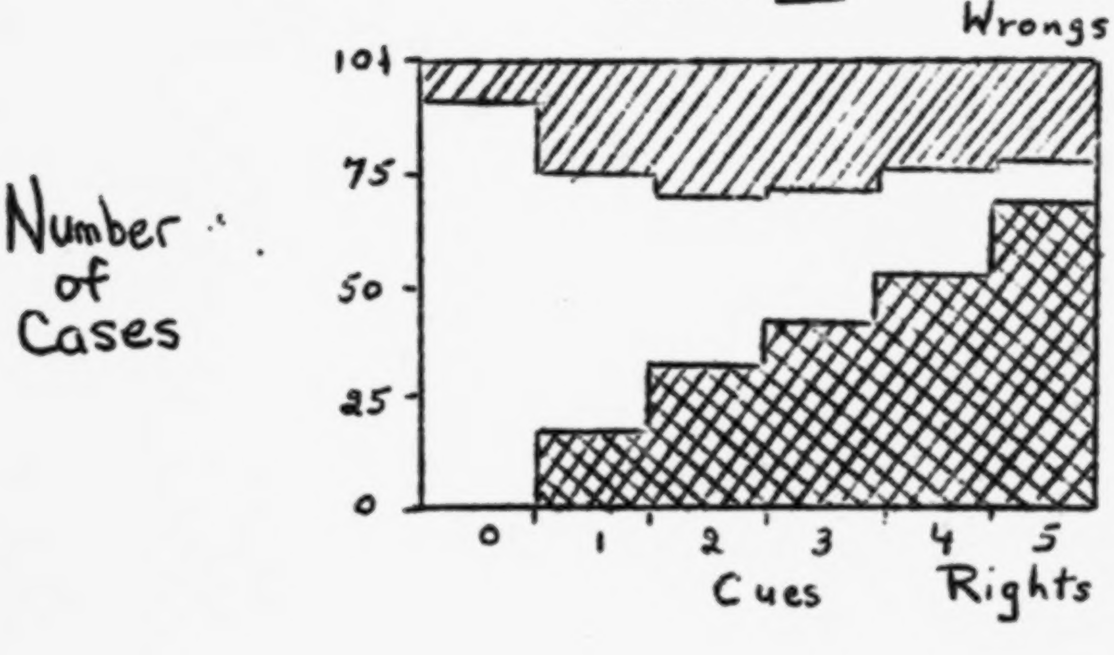


FIGURE 6 (Cont'd.)

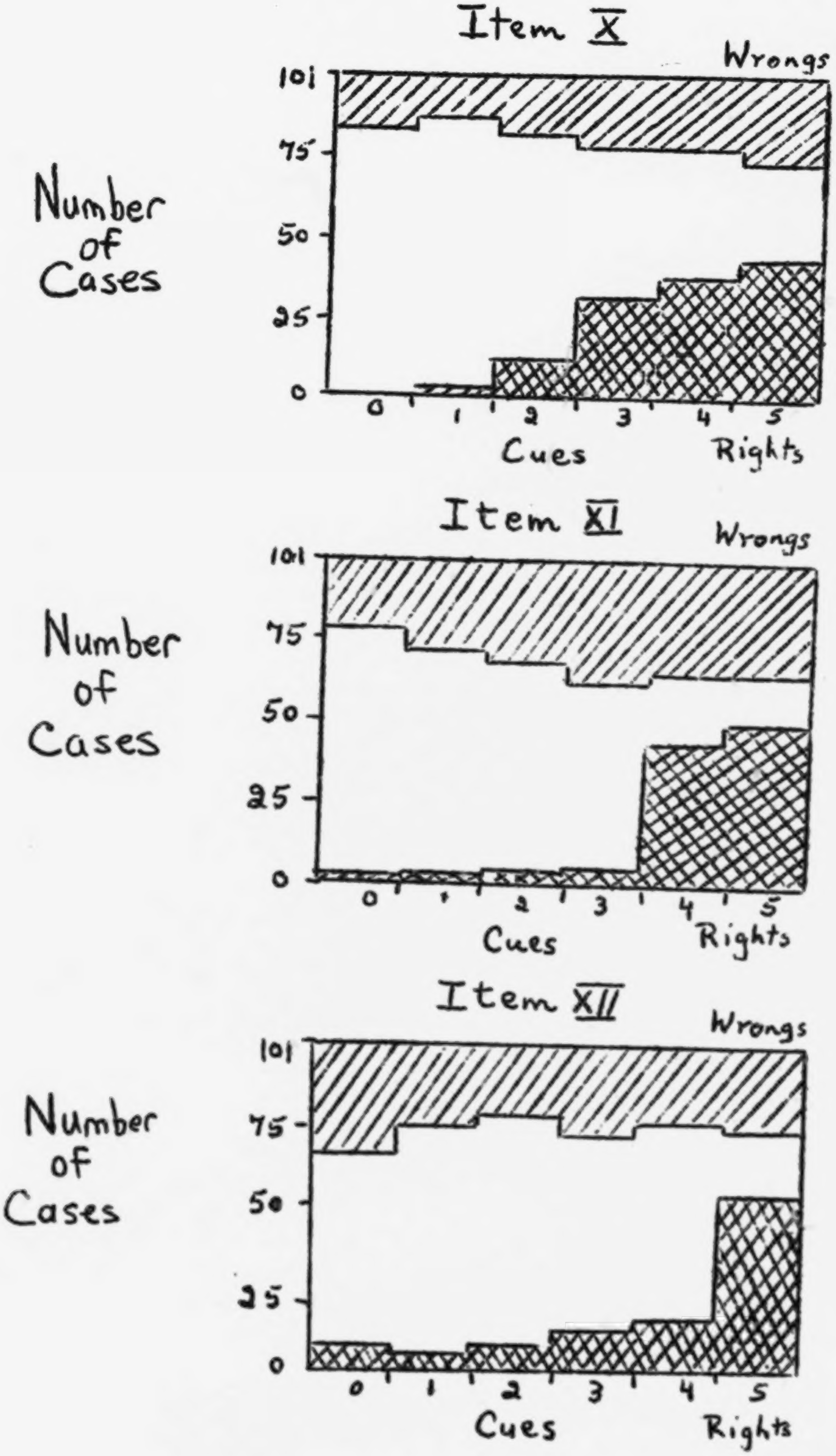
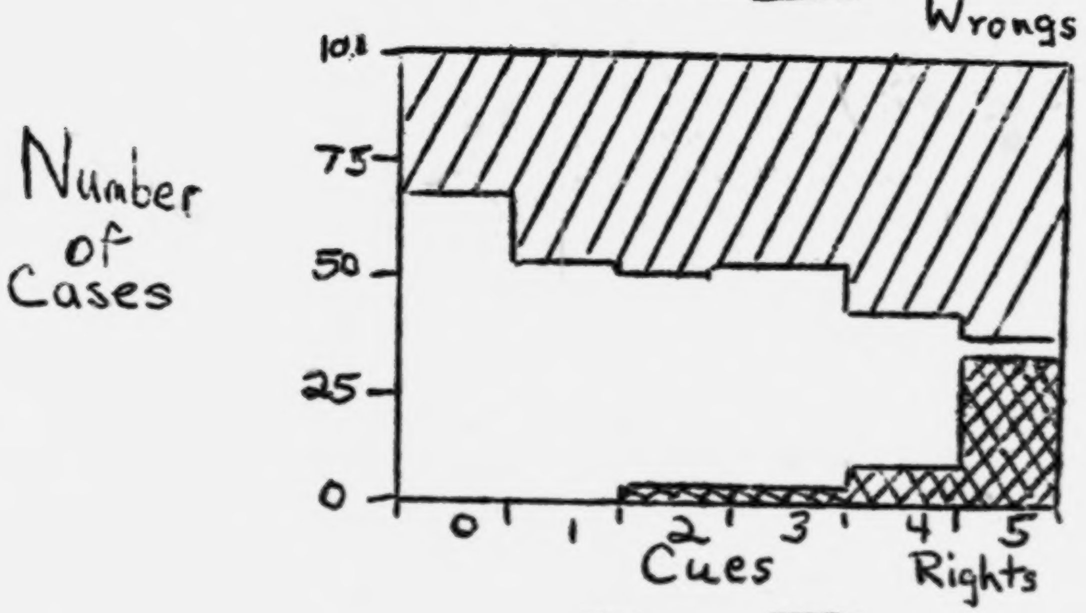
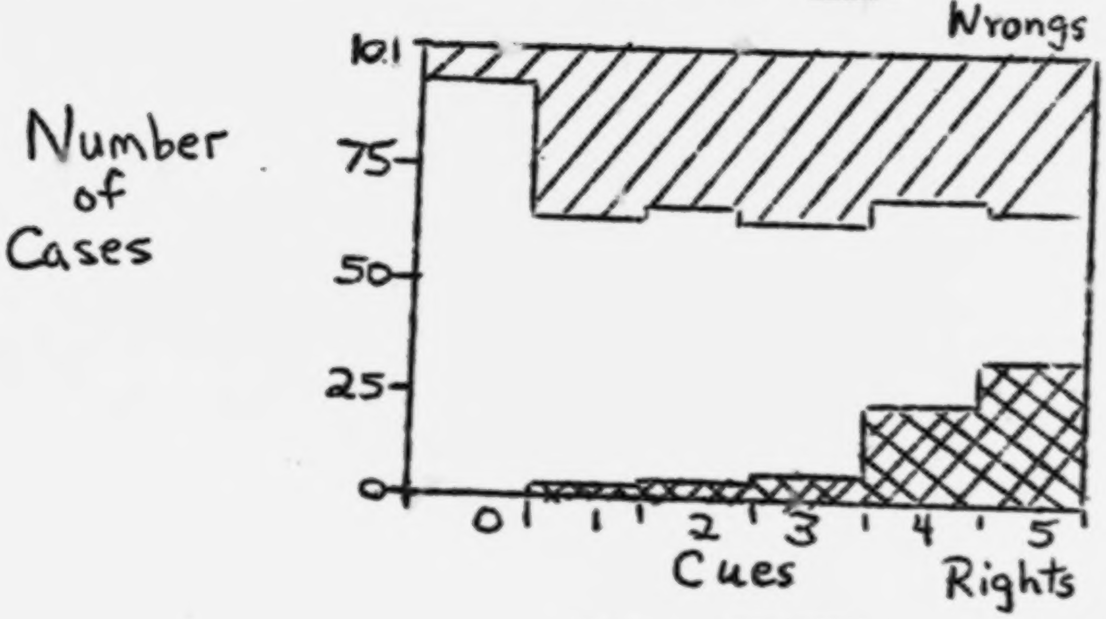


FIGURE 6 (Cont'd.)

Item XIII



Item XIV



Item XV

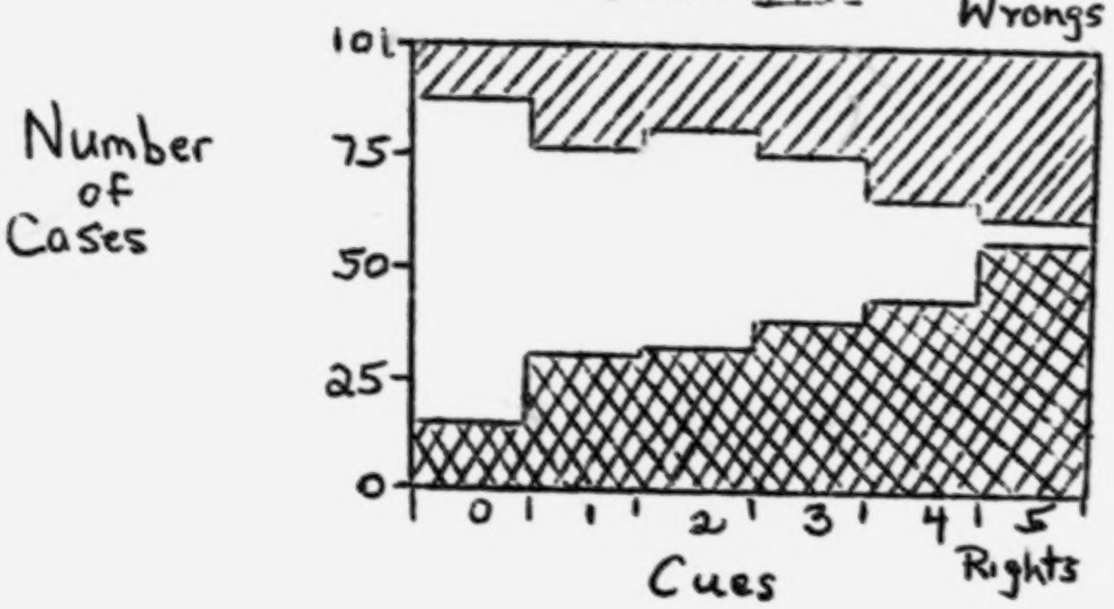


FIGURE 6 (Cont'd.)

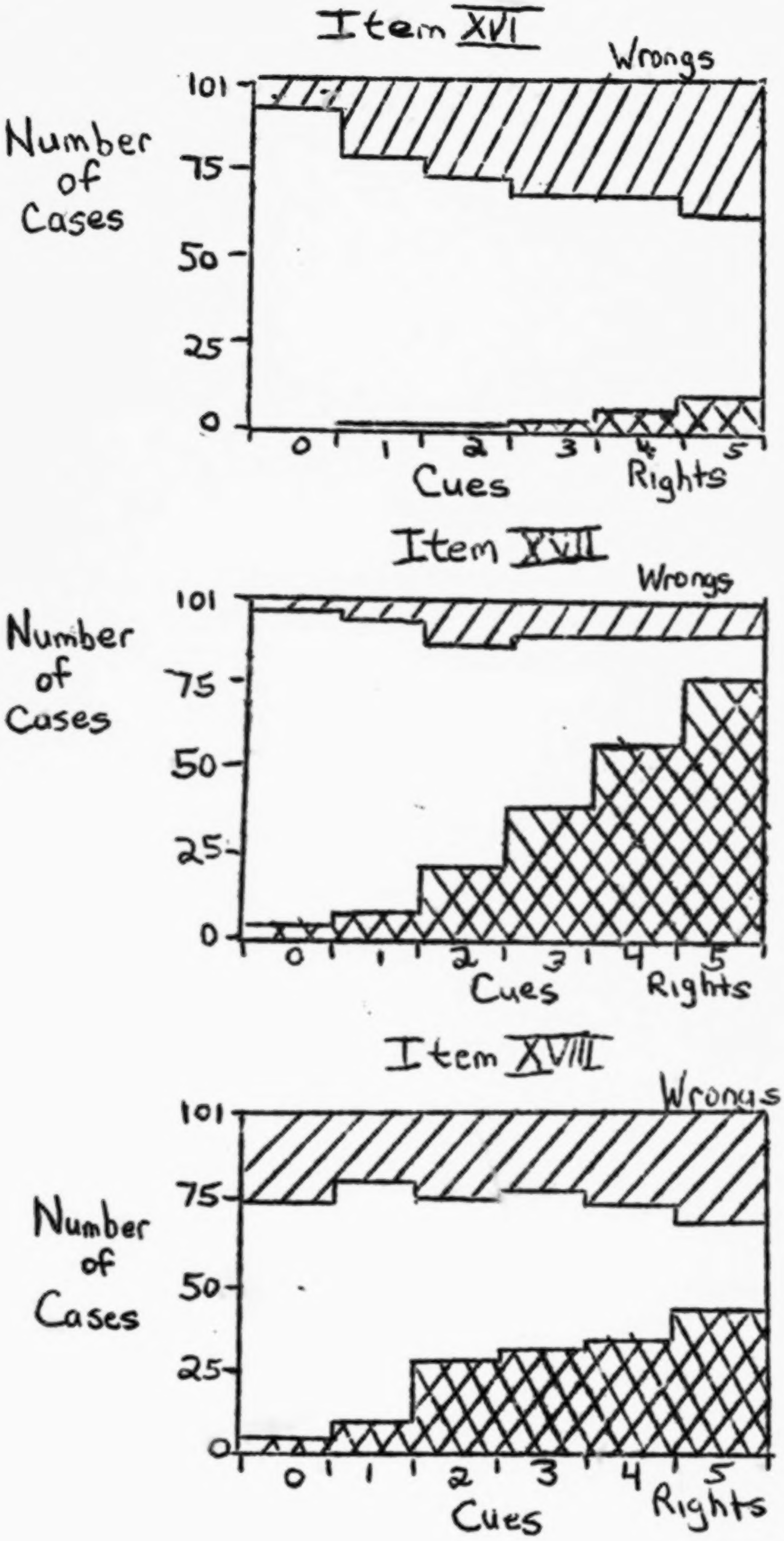
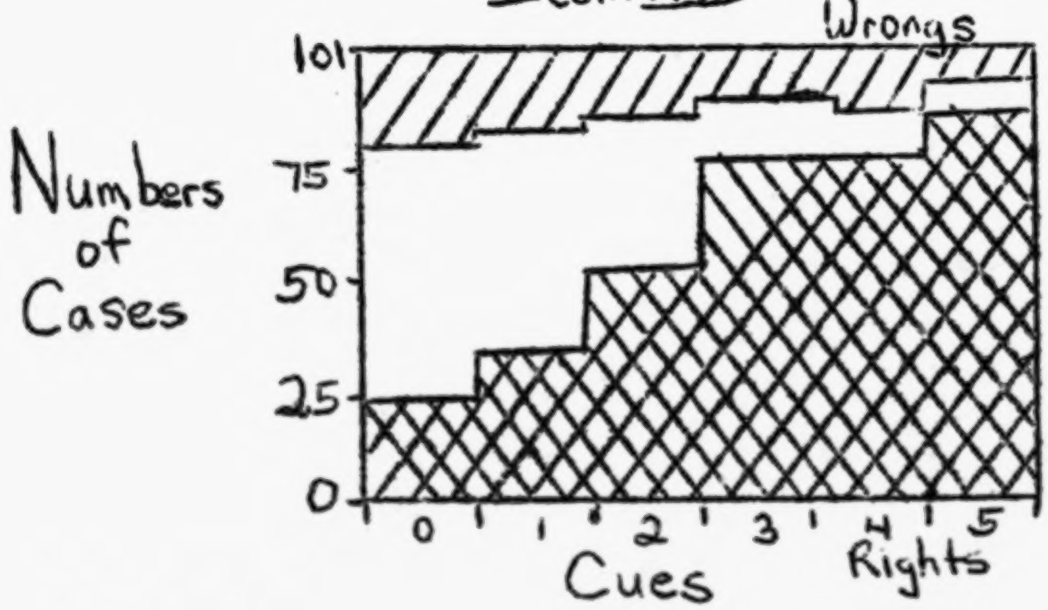
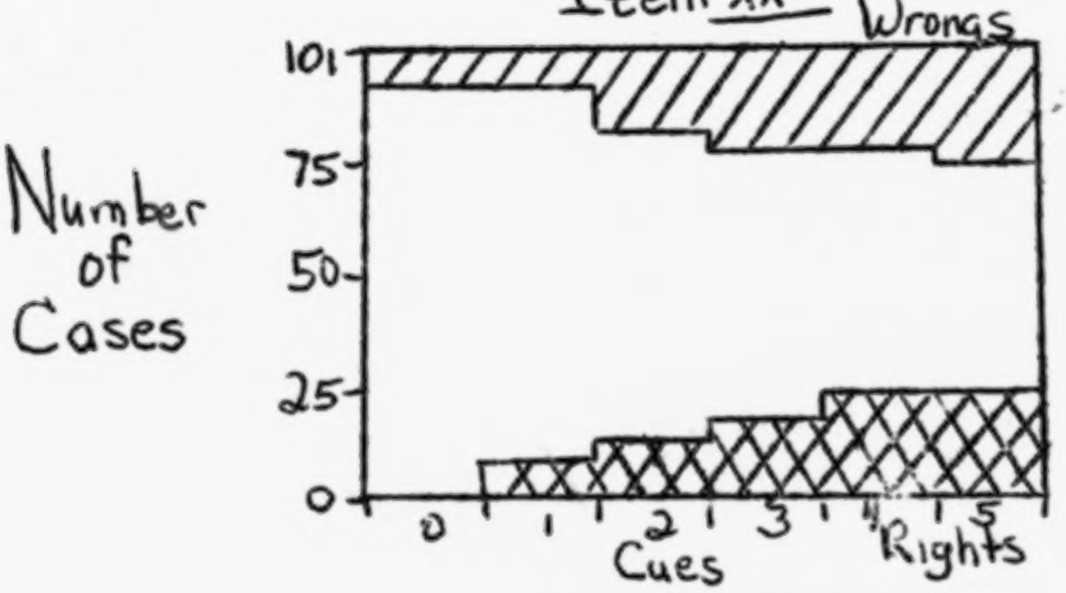


FIGURE 6 (Cont'd.)

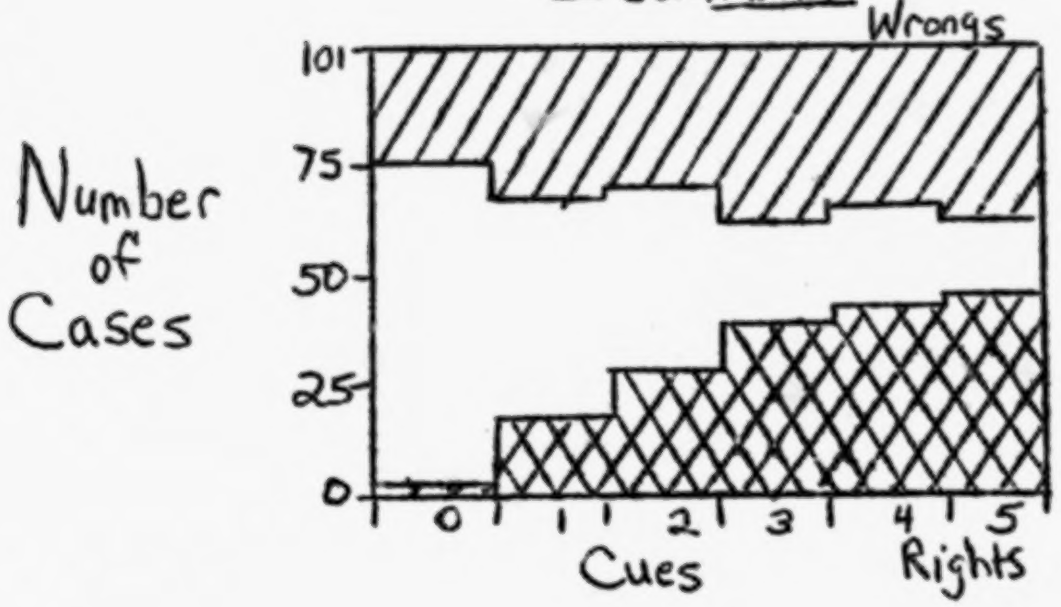
Item XIX



Item XX



Item XXI



The illustrations also disquietingly reveal, however, that wrong responses also became increasingly frequent as the clues accumulated, and on many occasions increased more markedly than did correct responses. Were it not for some evidence derived from certainty ratings (see below), these patterns would most certainly imply that, in general, the sample of junior high school students studied cannot be trusted with inferencing, since they seem to feel constrained to make inferences as the amount of information available to them increases. The respondents did this despite the fact that their response to the increase in information quite frequently led them astray.

Examination of the response patterns in respect to right responses alone reveals the expected trend of an increased correctness with the accumulation of clues. If the number of individuals producing correct responses may be used as an index of the informativeness of the clue, the illustrations reveal the wide range of informativeness. Targets alone rarely supplied adequate information to more than 5% of the sample. Some clues fail to be informative at all, as for example, clues 1 through 3 in Item VIII. Clue 1 in Item XIV might have been rather misleading, since it contributed very little to right responses but very largely to wrong responses. On the other hand, the additions of some clues, particularly those occurring late in the items, proved sufficient to yield additional correct responses for as much as 30% of the sample.

The histograms for "Wrong" responses were frequently curvilinear. That is to say, the numbers of "Wrongs" would sometimes increase until one of the middle clues, and then, as the numbers of "Rights" increased, the numbers of "Wrongs" would decrease proportionately. These patterns, where they did occur, may be taken to imply that in the general sample there is considerable amount of flexibility. That is to say, there is adjustment of incorrect inferences to correct ones when information is added.

Figure 7 illustrates for the 21 items the plots of the median certainty ratings for "Right" and "Wrong" responses at each clue. Medians rather than means were plotted because the distributions were frequently markedly skewed. It is to be noted, further, that some of

FIGURE 7

Median Certainty Ratings for Right and Wrong Responses on Twenty-One Items of the Visual Inference Test N = 101

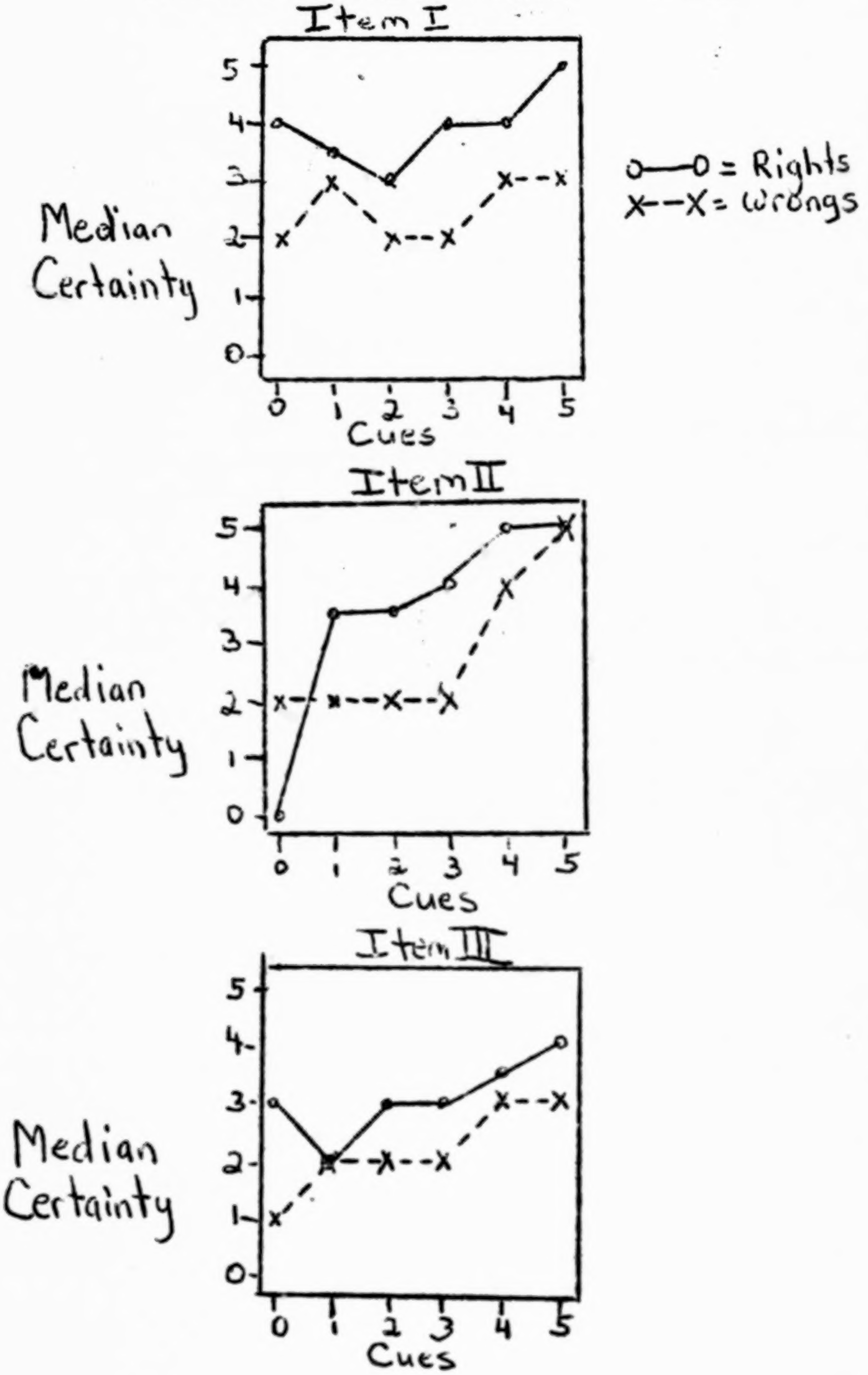


FIGURE 7 (Cont'd.)

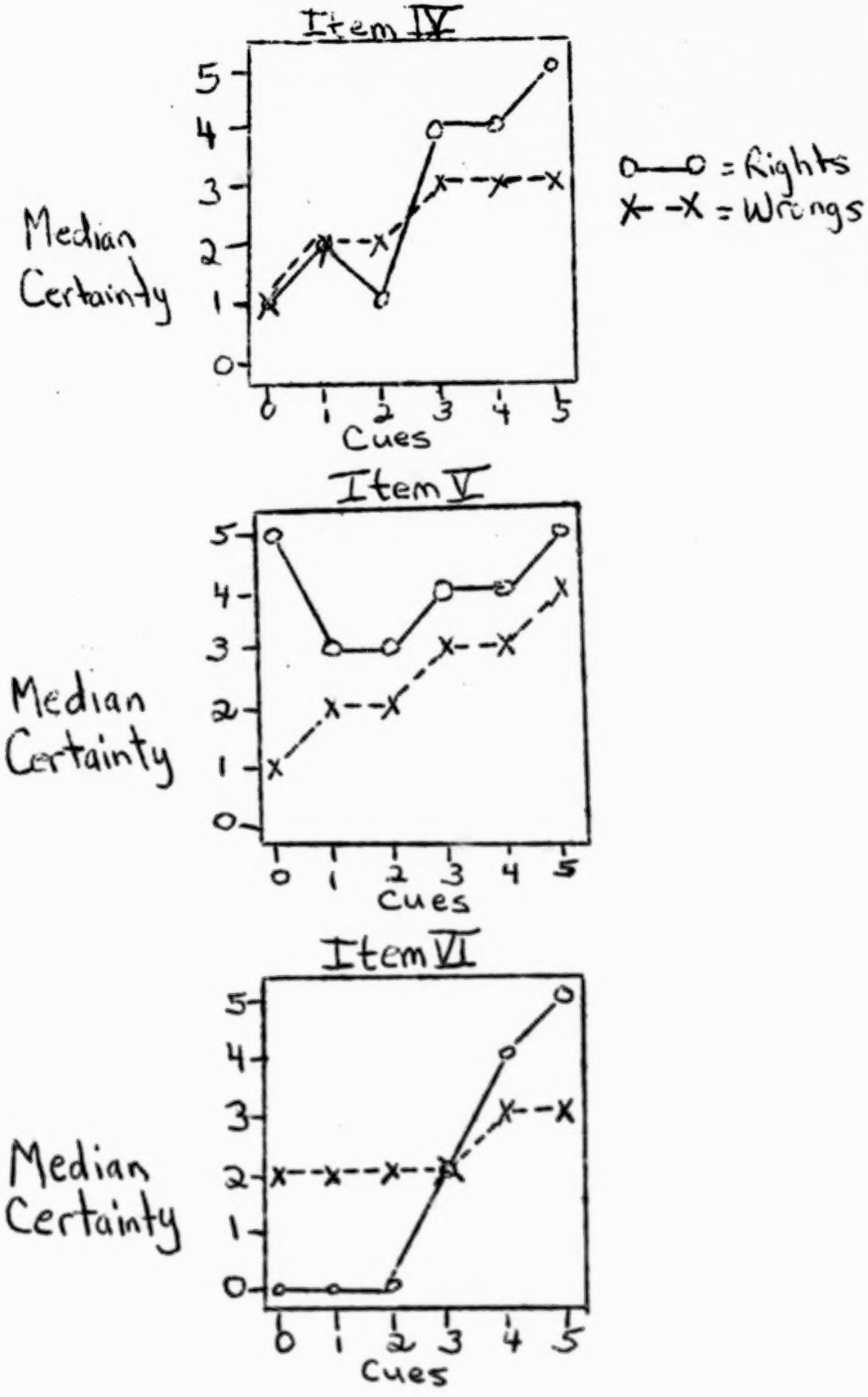
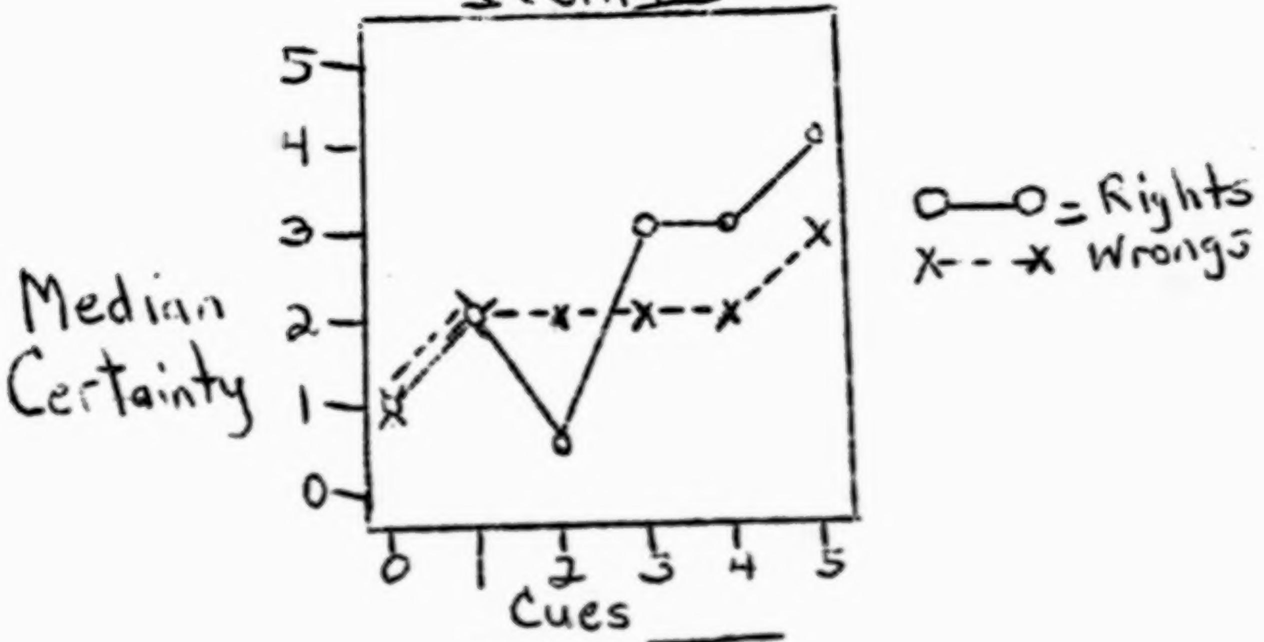
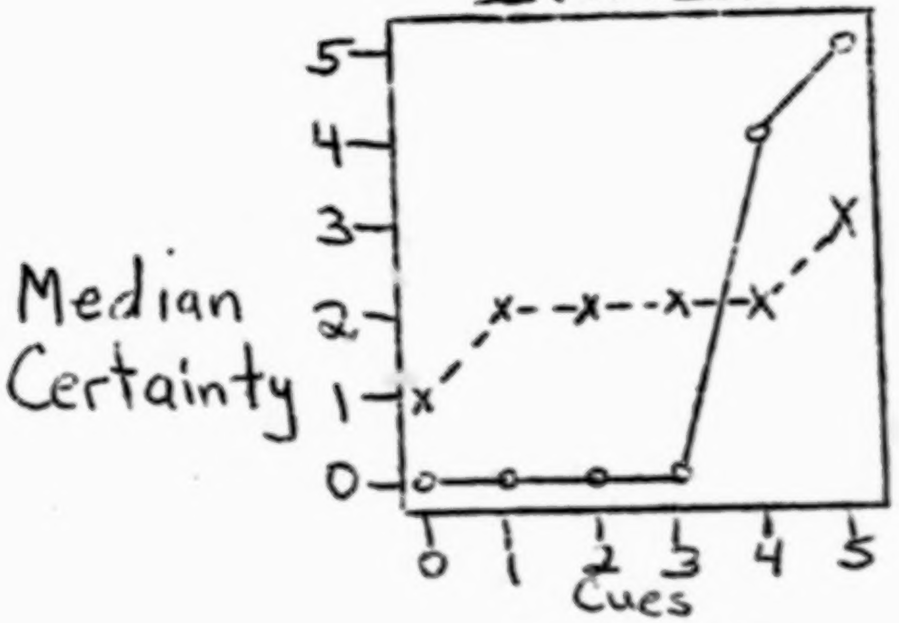


FIGURE 7 (Cont'd.)

Item VII



Item VIII



Item IX

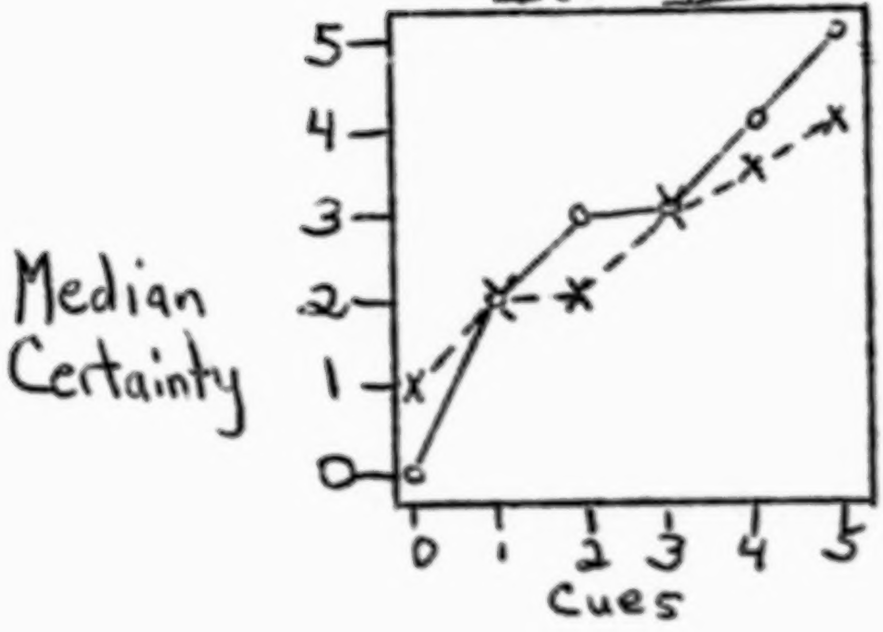
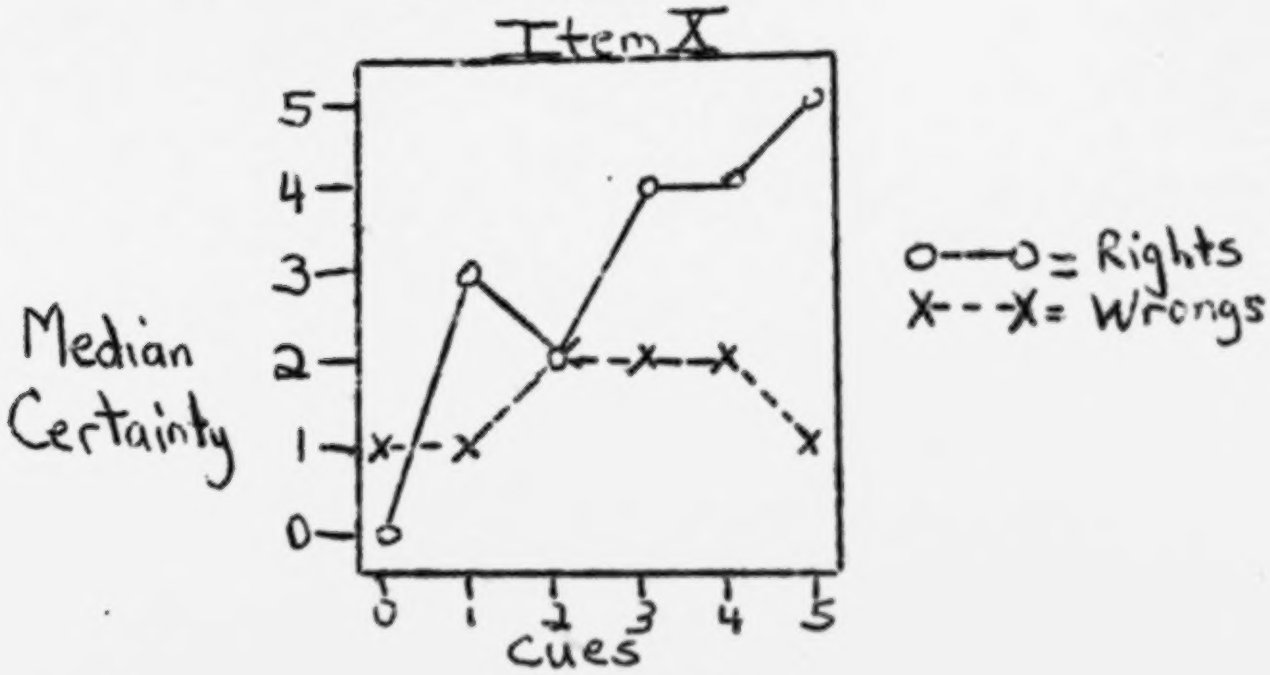
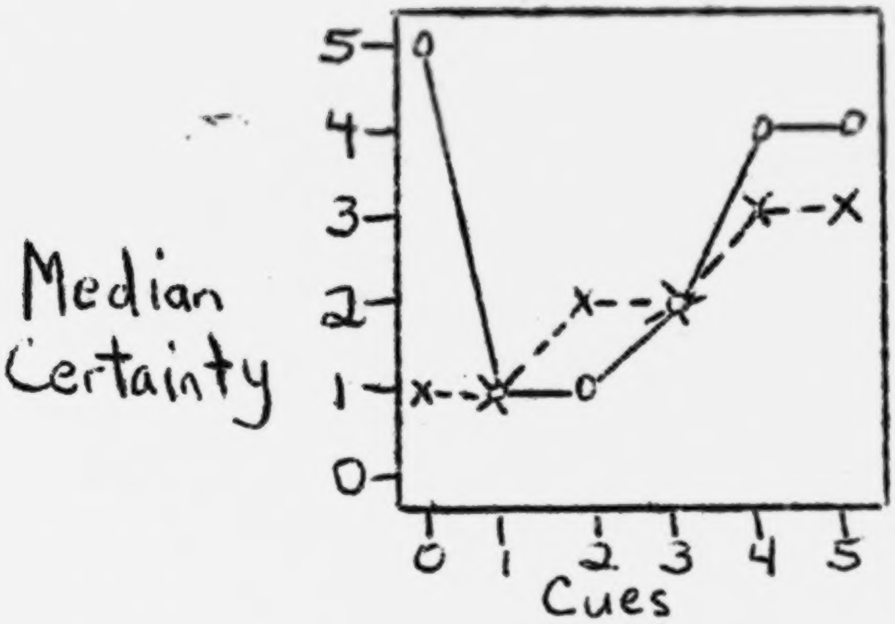


FIGURE 7 (Cont'd.)

Item X



Item XI



Item XII

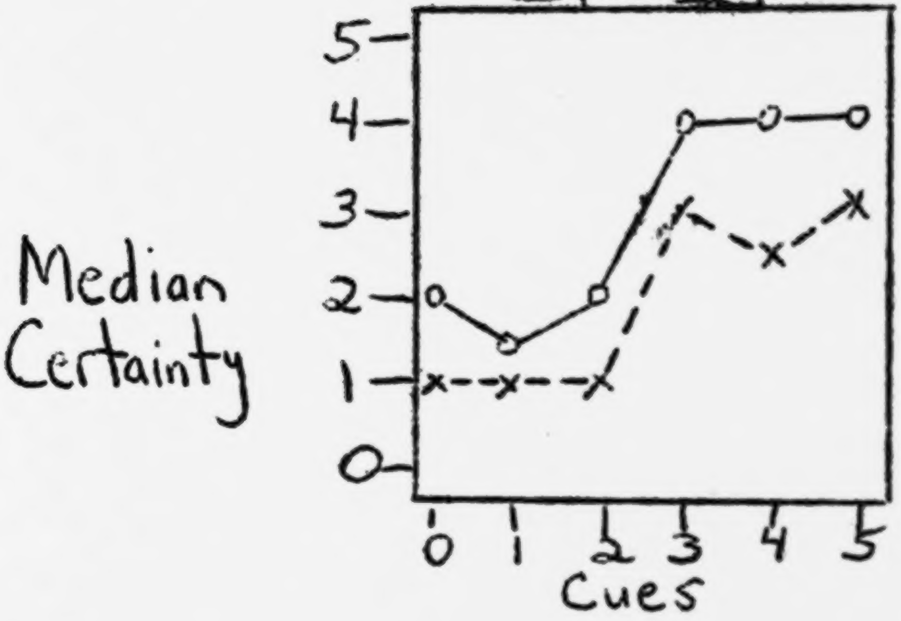


FIGURE 7 (Cont'd.)

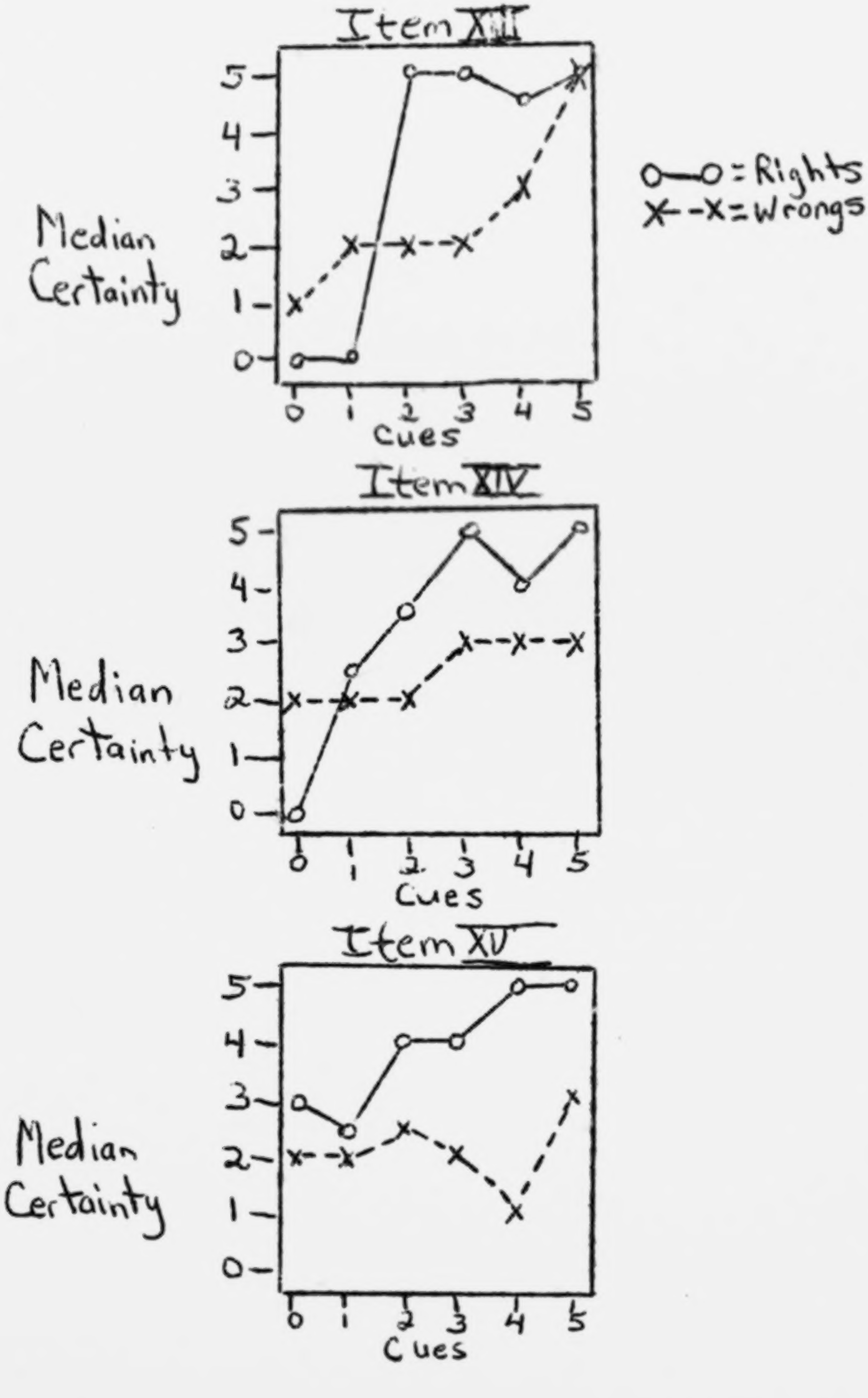


FIGURE 7 (Cont'd.)

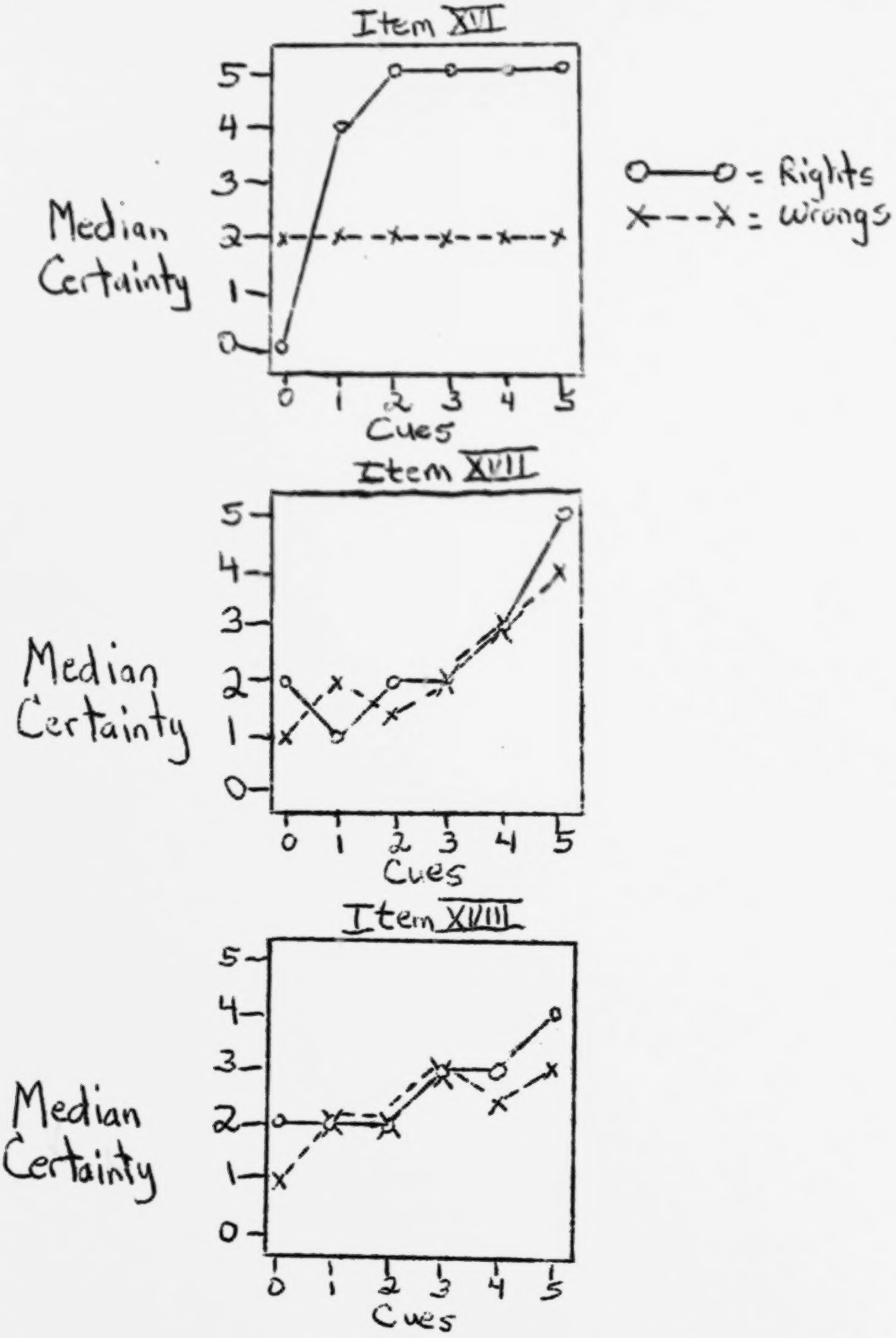
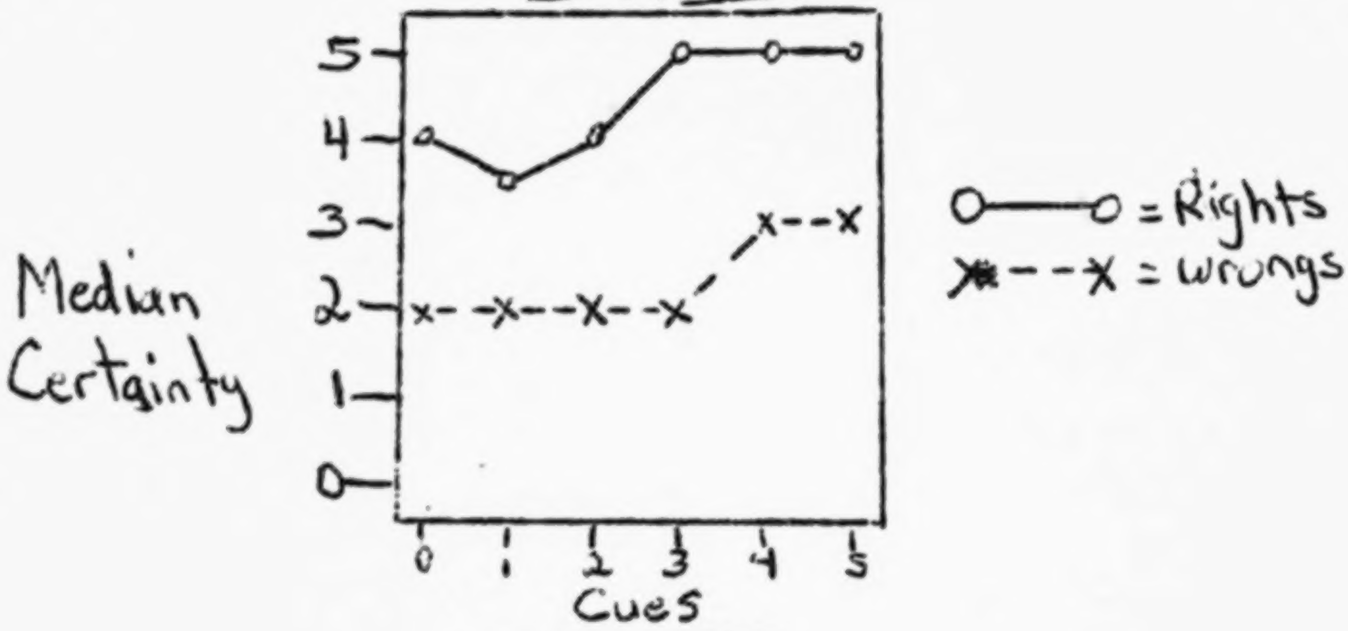
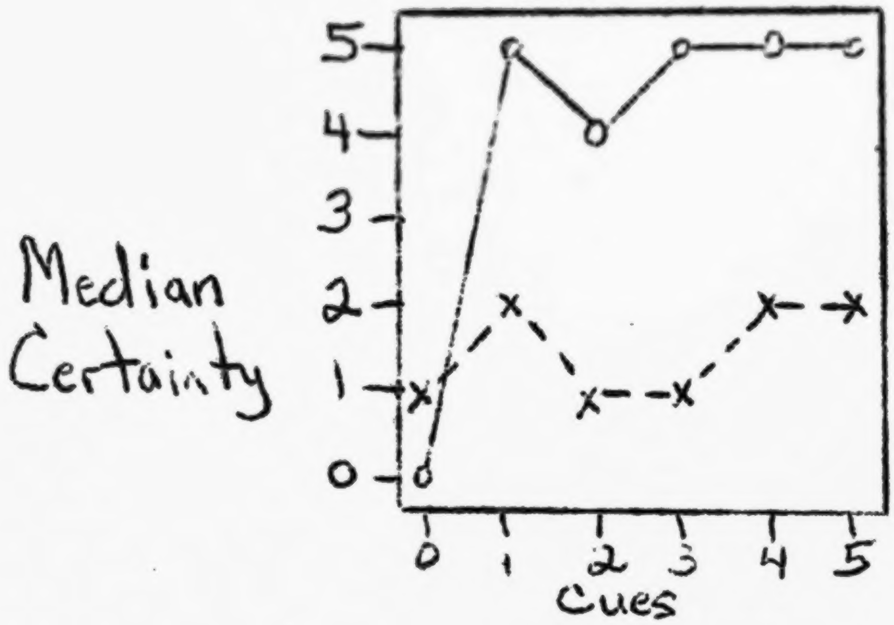


FIGURE 7 (Cont'd.)

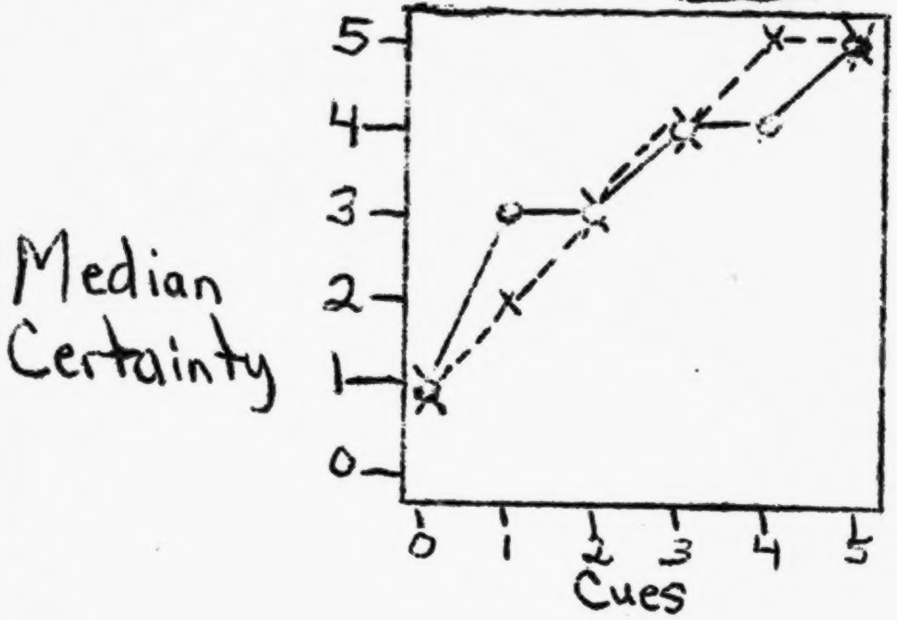
Item XIX



Item XX



Item XXI



the data points, particularly those associated with early "Right" responses and early cues, are sometimes based on a single case or on a very small number of cases.

Figure 7 reveals the expected general tendency for certainty ratings to rise as the amount of available information increases. The slight deviations from this trend occurred mainly at clues 0 and 1.

The plots further reveal that with the exception of some responses at clues 0, 1 and 2, the certainty ratings for "Rights" are equal to or regularly higher than the ratings for "Wrongs" in all items, save one. It would seem that respondents could, to some degree, distinguish "Wrong" responses from "Right" ones, and that they frequently needed the additional information supplied by later clues to make this distinction. Thus, the frequent "Wrong" responses noted with some alarm in connection with Figure 6 may not be so much a matter of poor inferencing and untrustworthiness of the population as it may be an indication of a general acceptance of the challenge of the task and willingness to accept the possibility of being "Wrong."

A question that is immediately raised by these findings is: What is the degree to which the opportunity for supplying certainty ratings increases the number of "Wrong" responses? A finding that students are more likely to attempt to formulate a response and to express it if they are provided with an opportunity for indicating their own confidence or doubt about that response, would have important implications not only for the measurement of one of the components of inferencing, but for the pedagogy of inference as well. This question, in turn, emphasizes the importance of measuring individual adjustments to variations in the pay-off matrix and the need for incorporating these in the test. A rigorous study of the effect of the opportunity to provide certainty ratings is, obviously, also called for.

If the task of the test is a valid paradigm for the actual inference process, there is a strong possibility that experience with the items may be of some didactic value. Certainly a sample item may prove useful in illustrating how inferences occur. But a possibility exists that learning may occur in the course of the test and that the patterns of the later items reflect this learning. The available data do not suggest a definite answer to this problem although they may be indicative of a slight tendency toward fewer responses and lower certainty ratings in connection with earlier clues in the later items. An analysis of data collected from equated groups responding to the items presented in various orders is called for. A larger number of items than are presently available would be required for a test of temporal trends. The question raised here suggests another dimension than the test might measure: the individual's rate of learning as he copes with inference problems.

Response Patterns of Individuals

Figure 8 shows data summaries and graphic representations of 8 individual response records selected to illustrate some of the kinds of response patterns the test can elicit. There are questions as to whether the patterns to be discussed are stable within individuals over time and whether the characterizations according to patterns are predictive of inference behavior in other contexts. But these questions of predictive validity are reserved for further exploration.

It is possible to prepare plots of individuals' responses across items in a manner analogous to the plots of items across individuals. Thus each individual is represented in Figure 8 by two graphs. The first is a pair of histograms of right and wrong responses with the zero point for "Rights" on the bottom of the figure and the zero point for "Wrongs" on the top of the figure. The second graph shows the plots of median certainty rating for right and wrong responses at the target and at each of six clues. The figures for each individual are based on 24 items.

Inspection of the eight sets of representations in the figure reveals generally that all the selected cases showed at least to some extent the expected trend of increased correctness with increased information. But the trend for the total number of responses to increase with each clue (or for the "Omits" to decrease) which appeared so markedly in the examination of items, does not seem to be a universal pattern for all respondents when examined individually.

FIGURE 8

Histograms and Plots of Certainty Ratings for Responses on the Visual Inference Test for Eight Selected Individuals

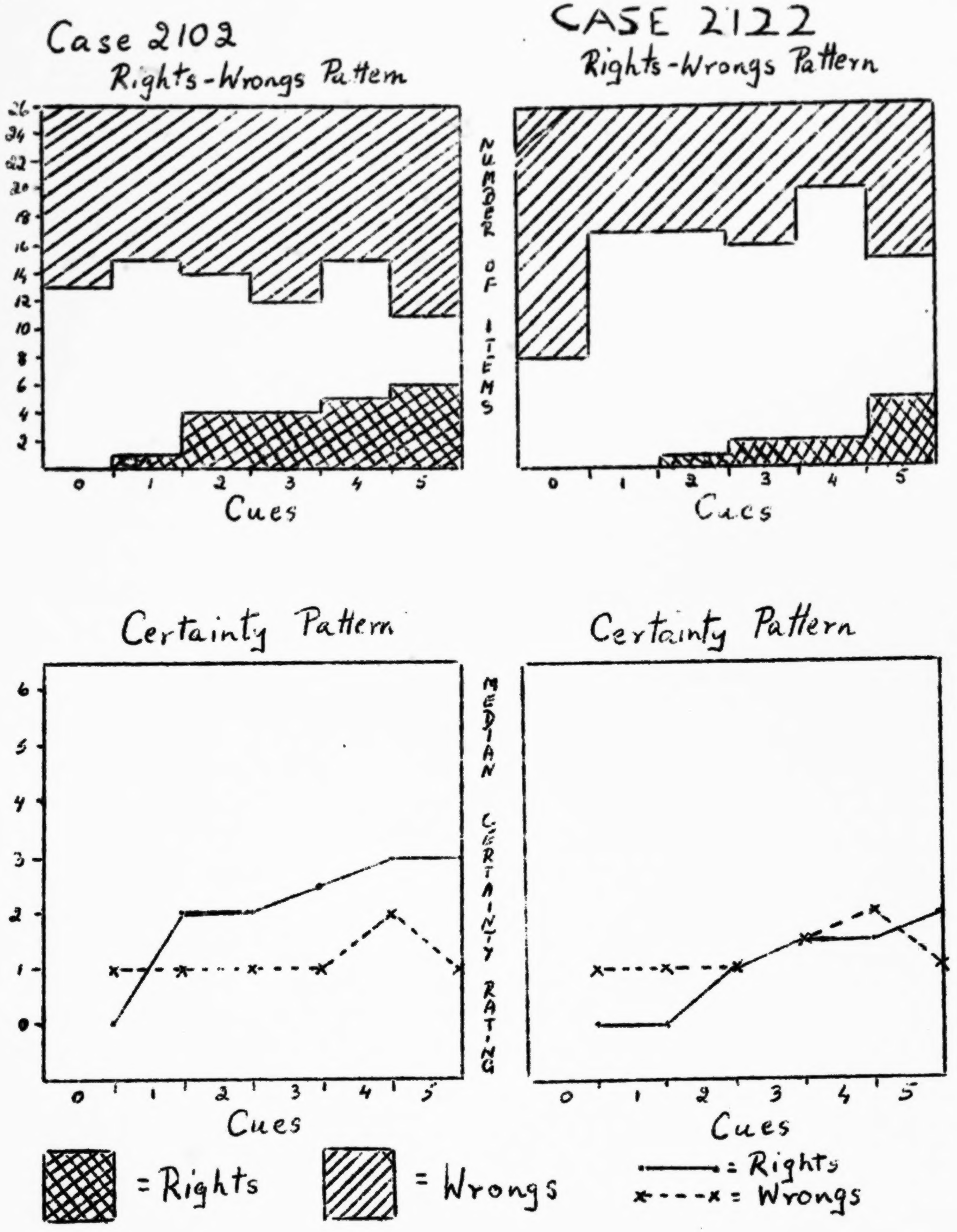


FIGURE 8 (Cont'd.)

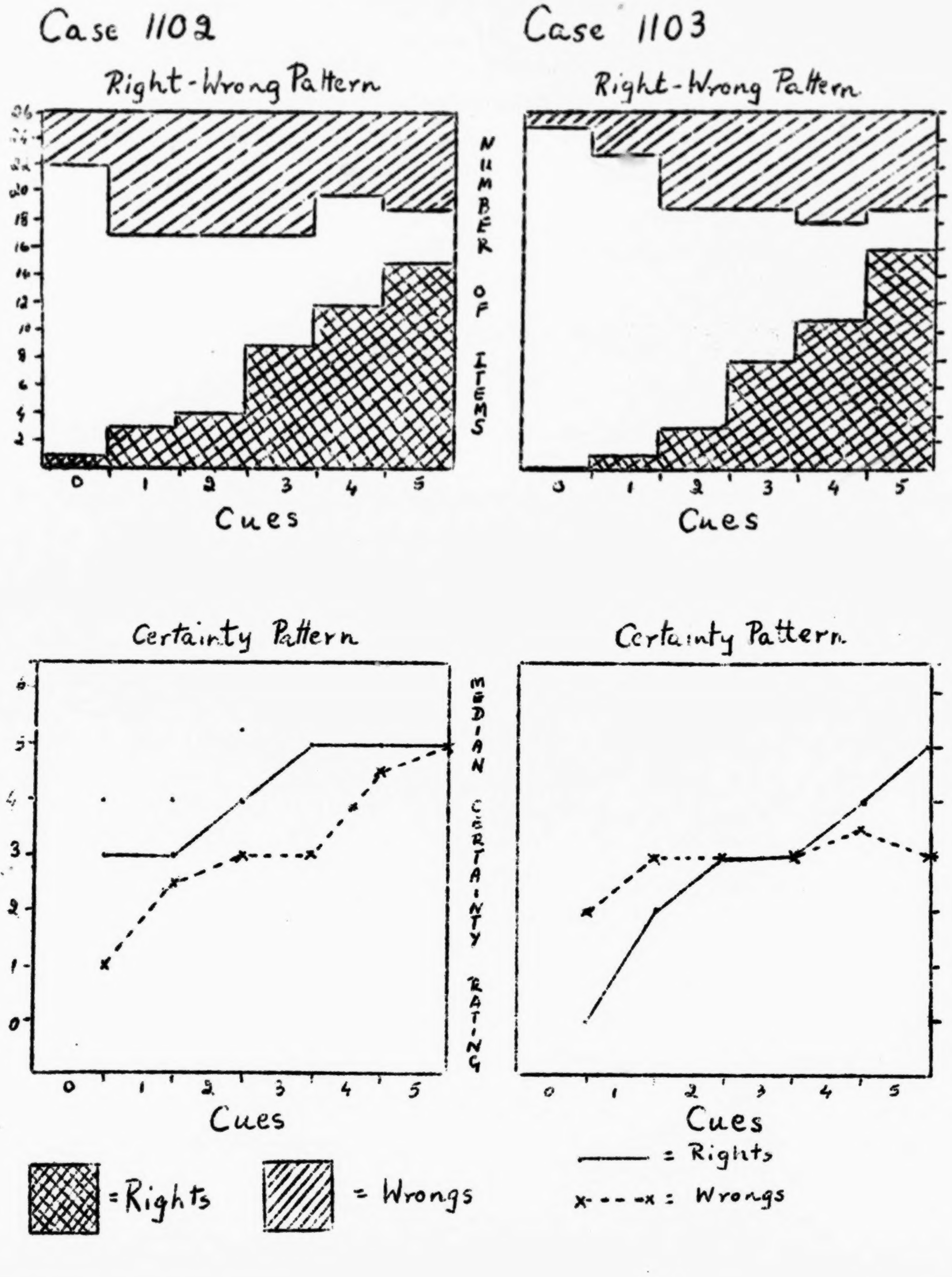


FIGURE 8 (Cont'd.)

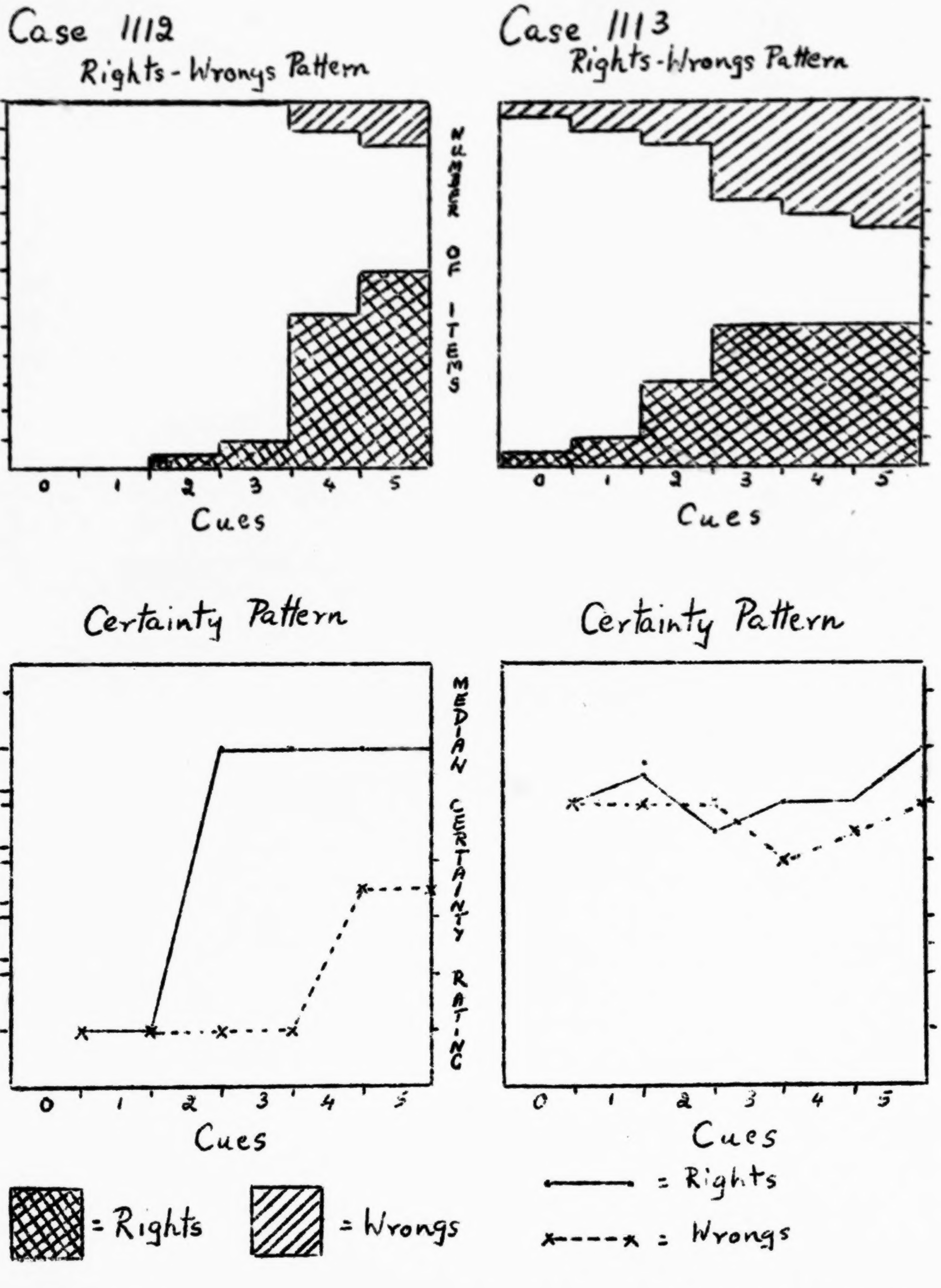
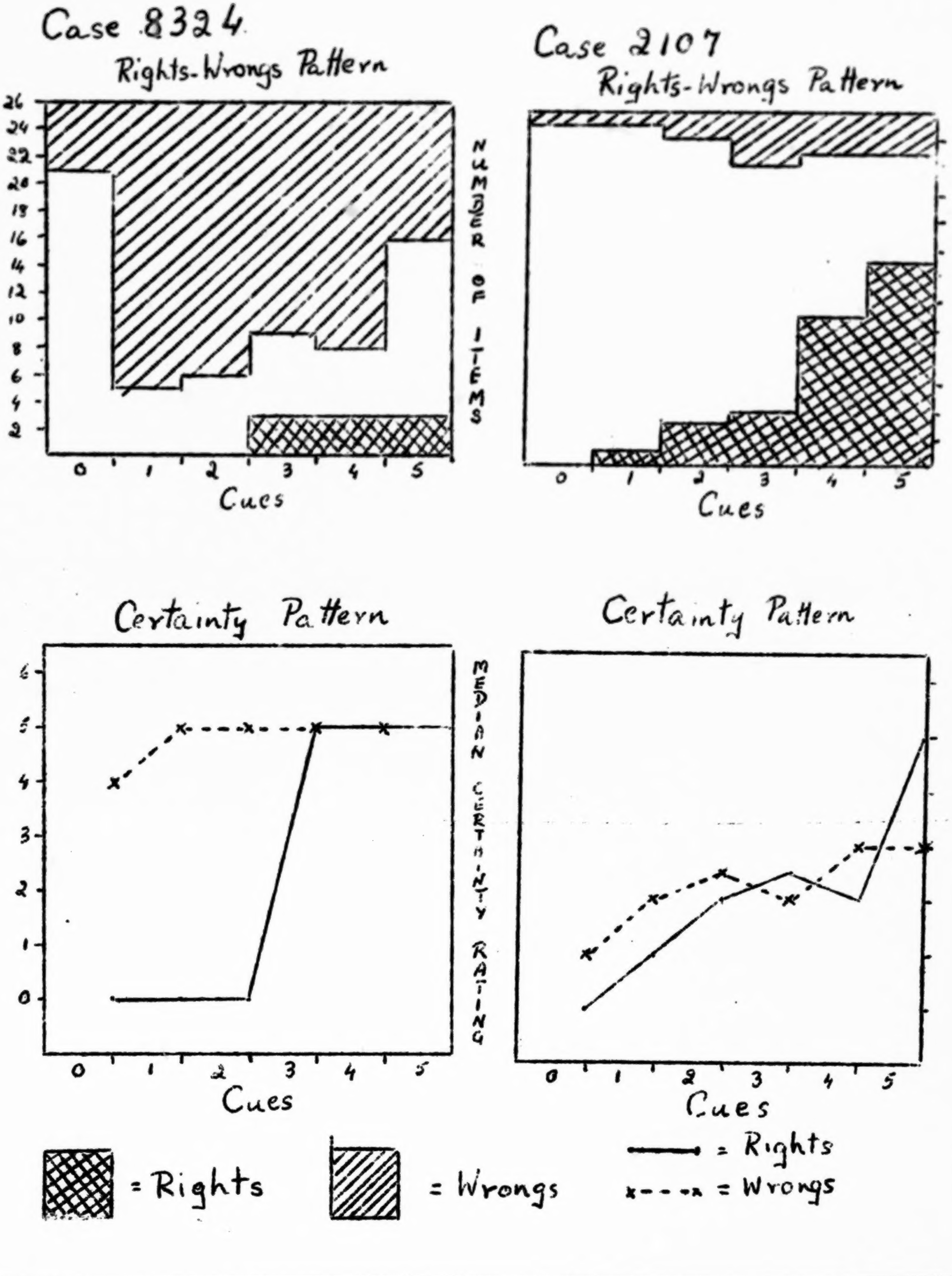


FIGURE 8 (Cont'd.)



Some respondents seemed, occasionally, to "pull in their horns" as they adjusted to data contradictory to their original inferences. Others maintained constant rates of wrong responses. The medians of certainty ratings for wrong responses was, on occasion, higher than the ratings for right responses at the early clues but this was never the case at the later clues. The means of the certainty ratings, computed by using the number of rights, wrongs or the total number of responses, as appropriate, reveals even more markedly the general adjustment of certainty ratings to the correctness of the response. Indeed, the investigator has yet to encounter a single instance in which this is not the case.

The response patterns of individual cases proved to be of considerable interest. Case No. 2122 (Figure 8) exhibited the lowest certainty ratings of the selected cases (and well he might have, given his ratio of approximately 6 wrong responses for every right one; his number of right responses was among the lowest). This individual responded readily and frequently even to the target alone and maintained a relatively high response rate over all the clues. This fact may not be taken as an indication of inadequate assessments of his responses. His response rate seems to be a measure of his "cognitive courage" and his certainty ratings seem to imply a realistic assessment of the correctness of his responses.

Case No. 2102 was quite similar to the preceding case. He seems to have been a slightly more competent inferencer in this task than the preceding case was. His responses were slightly more frequent than the preceding case but they tended to occur somewhat later in the item series. He seems to have felt slightly less pressured to respond as the information accumulated, while additional information made the preceding case (2122) abandon some responses. Thus,the present case may have exhibited less "cognitive courage" and less intelligent adjustment to the test task. His certainty ratings were realistic in the context of his performance.

Cases No.1102 and 1103 are probably typical of the general population since their response patterns resemble the patterns observed in the general population when studied over items. Both cases exhibited the trend of increased responding with increased information and the tendency for wrong responses to give way to right ones at the later clues. Case 1102 was considerably more early and frequent in his responses than 1103. His responses were indeed more frequent than cases 2122 and 2102, but were not earlier. Case 1102 achieved a slightly larger number of correct inferences than did case 1103 but his ratio of wrongs to rights suggests that this might have occurred by chance. On the other hand, his certainty ratings reveal better discrimination between "Wrongs" and "Rights" than 1103.

Case 1113 was also similar to cases 1102 and 1103 but seemed somewhat less competent to cope with the inference situation. The increments in right responses as the clues increased were generally small, while the number of wrong responses elicited by additional information increased. Certainty ratings did not reveal as sharp a discrimination between wrongs and rights as other individuals exhibited. The plots of medians, rather than the differences between mean certainty ratings for rights and wrongs, are used as the basis for this remark. (It is to be noted that neither the certainty rating scale nor the means of certainty ratings seem to be measures of equal intervals. Further development to refine the scaling is called for.)

In case 1112 we have an individual who (in contrast to the others) may not have done much but who knew what he was doing when he did something. His responses were infrequent and late in the series. His final number of rights was relatively quite high and the number of wrongs was negligible. More striking is the sharp discrimination in certainty ratings between right and wrong responses and high certainty ratings assigned to right responses as soon as they appeared. Some respondents seemed to have permitted additional information to enhance their certainty. Case 1112 seems to have withheld his responses until he was certain they were correct. Then he was indifferent to additional information.

The above selection of cases consists of individuals, who, generally speaking, seemed to know their own limitations and abilities. Competence in inference making seemed to be accompanied by high certainty ratings and incompetence is accompanied by low certainty ratings. Inspection of all the responses in the sample and the general statistical analyses seems to confirm this generalization. In order to dispel the impression that this rather accurate self-assessment, reflected in certainty ratings, is always the case, two rare instances of deviations from the rule were selected for presentation.

Case No. 8324 presents a stark contrast with Case No. 1112. This is an instance of the nearsighted Mr. Magoo who lunges forth with incorrect inferences as though there were no reason for attempting to make correct ones. At the last clue only was there a tendency to withdraw incorrect inferences, despite the fact that the evidence of five clues should by this time have suggested to him the error of his ways. And while he showed a slight tendency to inhibit his wrong responses at the end of the series, his certainty ratings for wrong responses continued to rise. As to the mere three items responded to correctly-- he is perfectly certain of these! Although his number of "Rights" at the last clue and his proportion of "Rights" to "Wrongs" are among the very lowest observed, his certainty ratings are among the very highest observed.

Case No. 2107 presents a differnt form of unrealistic self-assessment. The histograms for right and wrong responses seem to place this case in a category with case No. 1112, although case No. 2107 revealed a slight tendency to respond somewhat earlier and somewhat more frequently. The final number of correct responses is near the top of the distribution and the proportion of "Rights" to "Wrongs" is the highest to be observed. Yet the certainty ratings resemble those of the poorest inferencers, such as cases 2122 and 2102. The fact that the plots of certainty ratings for Rights and Wrongs cross each other frequently suggests that even if this is largely a case of false modesty or very high aspiration level in certainty ratings and constrained behavior in inferencing, there is also an element of inaccuracy in the assessment of correctness of response.

General Response Patterns on the Total Test

The following scores were computed for each case in a sample of 116 cases using 26 items to comprise the test:

(a) The number of correct responses at each clue (C). The possible total score at each clue was 26. There were 6 scores for each respondent.

(b) "Ziller Scores," (ZS) for each clue. This is a purported measure of "risk taking" and is computed from the formula:

$$Z = \frac{\text{Number of wrong responses}}{\text{Number of wrong responses + number of omitted responses}}$$

Ziller Scores range from 0 to 1.00.

(c) Mean Certainty Ratings (MCR) for right responses at each clue. The range of Certainty Ratings was from 0 to 5. The arithmetic mean was computed for each respondent.

(d) Mean Certainty Ratings for wrong responses (MCW) arrived at by procedure used in (c) above.

Table 2 shows the means, standard deviations and intercorrelations among these scores.

TABLE 2

INTERCORRELATION MATRIX, MEANS AND STANDARD DEVIATIONS

Scores for: (a) Correct Responses (C) to Each Clue; (b) Ziller Scores (ZS) for Each Clue;
(c) Mean Certainty Ratings for Rights (MCR) at Each Clue for S's;
(d) Mean Certainty Ratings for Wrongs (MCW) at Each Clue for S's;

N = 116 Decimal Point Omitted

	(C)						(ZS)						(MCR)						(MCW)					
	CLUE						CLUE						CLUE						CLUE					
	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
(C)																								
0	100	57	44	34	32	33	47	25	25	20	14	18	76	25	24	19	14	17	08	-00	04	04	01	-02
1		100	82	67	63	58	23	06	14	17	18	20	49	52	36	29	35	29	07	-12	00	07	08	10
2			100	83	76	68	21	09	21	20	19	21	40	46	47	34	43	35	08	-12	05	08	13	19
3				100	88	82	21	09	16	15	15	22	29	46	55	39	49	44	19	-04	07	18	22	24
4					100	91	20	-01	05	06	11	23	31	46	50	36	50	40	12	-13	02	17	18	20
5						100	20	-05	-02	-01	00	24	34	45	45	39	46	42	19	-13	06	14	19	21
(ZS)																								
0							100	59	49	41	26	16	35	09	17	18	17	14	23	-02	10	04	04	05
1								100	86	74	63	32	16	-12	-02	-04	-02	00	18	08	14	09	06	08
2									100	87	74	48	22	-05	07	-04	06	05	17	05	07	08	12	12
3										100	83	59	17	-04	08	-09	05	03	13	00	10	03	10	11
4											100	71	10	-03	08	-09	09	02	10	05	12	14	15	13
5												100	12	04	15	-04	21	08	10	-16	-02	03	03	-03
(MCR)																								
0													100	35	34	32	22	21	14	12	16	12	16	10
1														100	67	53	53	34	22	08	16	31	30	25
2															100	66	58	46	23	22	17	32	32	27
3																100	66	73	24	22	24	35	35	34
4																	100	62	32	27	34	43	35	34
5																		100	24	24	30	35	40	41
(MCW)																								
0																			100	30	43	41	34	29
1																				100	66	53	45	36
2																					100	75	66	51
3																						100	80	65
4																							100	80
5																								100
MEAN	.59	1.75	3.06	5.16	7.98	10.41	.20	.27	.32	.40	.48	.63	.86	1.97	2.58	3.34	3.66	4.19	1.45	2.06	2.26	2.56	2.83	3.15
S D	.80	1.56	2.40	2.91	4.10	4.70	.18	.19	.21	.22	.23	.21	1.19	1.52	1.51	1.20	1.16	.92	.93	.92	.87	.89	.90	.88

SIG. .01 LEVEL WITH 115 DF = .235

Examination of the means and standard deviations reveals the likelihood that many of the distributions are markedly skewed since the standard deviations are frequently larger than the means. These distribution characteristics were unknown at the time the data were submitted for statistical analysis by the computer. They imply: a) that the median as a measure of central tendency would have been more appropriate; and b) that the correlations measure only a linear component of the inter-relations among the measures.

The means of the respondent's scores reveal the upward trends with clues noted in the preceding sections. With no clues, about one target in four was identified correctly by the entire sample, while at Clue 5 more than a third of the targets were correctly identified.

The rise in Ziller Scores accords with the noted proclivity of respondents to produce responses at the later clues. This interpretation is based on the observation that Ziller Scores are a measure of the proportion of wrong responses to right responses.

The Mean Certainty Ratings are somewhat lower for "Rights" than for "Wrongs" at Clues 0 and 1, but the trend reverses markedly at Clue 2 as was frequently noticed in the analysis of items and of individuals. Respondents who responded freely at Clues 0 and 1 are perhaps those who were unaware of the possibility of being wrong at these clues. The greater scatter of Certainty Ratings (greater standard deviations for right responses than for wrong responses) is probably a reflection of the fact that there are many individuals in the sample who reserve their high certainty ratings for right responses, thus spreading the distribution while the distribution remains essentially leptokurtic for wrong responses.

The correlations among each of the clues on each of the groups of scores, (i.e., correlations among numbers of "Rights", Ziller Score, etc.) revealed an expected, but interesting pattern. The correlations were almost always the highest between clues that were adjacent to each other and lowest between the most distant pairs of clues. This pattern implies that there were adjustments of behavior from Clue 0 to Clue 5 but that, for the sample in general, these adjustments were gradual. The generally high correlations imply a general counter-tendency toward persistence. Between adjacent clues the high correlations imply that there is more persistence than change. This pattern in general suggests that scores for the numbers of "Wrongs" might also have been profitably computed since it would be interesting to discover whether adjustment is greater when responses are wrong than when they are right. Further intra-individual correlations among clues, or proportions of change among clues,might provide a valuable index of the adjustment patterns of each respondent.

The correlations between correct responses and Ziller Scores seem to imply in some instances that a tendency for guessing is likely to result in some correct responses. In other instances general guessing behavior is unrelated to right responses. This formulation assumes wrong responses are guessing. (In general, the correlation of the Ziller Scores or any other measure of risk-taking with the number of rights may be taken as a measure of how conducive an ecology a test may be for inferencing or risk-taking.)

The correlations between Mean Certainty Ratings for Rights (MCR) and the number of correct responses (C) are not considered very meaningful since a response must occur for a certainty rating to occur. The correlations are, therefore, probably only artifacts of the scoring. The low correlations between correct responses (C) and Mean Certainty Ratings for Wrongs (MCW) corroborates this interpretation.

The low relationship between Ziller Scores and Certainty Ratings warns against equating certainty ratings with risk-taking. Certaintly neither score alone is a measure of risk-taking or "cognitive courage." It seems, given the independence of the measures, that certain combinations of Certainty Ratings and Ziller Scores may be taken to imply high or low cognitive courage.

The relatively low correlations between Certainty Ratings for "Rights" and "Wrongs" is consistent with the previous finding that Certainty Ratings are generally accurately related to whether responses are right or wrong.

Conclusion

From the above discussion, it seems that a rather inclusive and useful taxonomy of response patterns can be formulated on the basis of responses to the Visual Inference Test. A variety of scores and ratios may be formulated by using the numbers of right, wrong and omitted responses at various clues, Certainty Ratings, and the numbers of changes in responses (a matter left unexplored in the present study). It is tempting to use these scores as indices alone in validation studies. But it is expected that the true power of this instrument will be realized only when the scores and indices derived from them are used to assign respondents to various categories of inferencers which will be generated by the intersection of the dimensions the test hopes to measure. The typifications to be formulated are expected to be highly predictive of strategies for coping with ambiguous and probabilistic situations.

As for the present project, this sally into the realm where the psychologies of cognition and personality meet seems to justify the conclusion that generally speaking, the self-assessments of seventh-, eighth-, and nineth-grade socially middle-class pupils are realistic enough to trust them with problems of inference in probabilistic contexts. Their adjustments to discrepant and confirming information are various, but generally good. There is a wide range of "cognitive courage", generally well adjusted to the wide range of competence in making the visual inferences required by the test task.

Chapter X

EVALUATION

This chapter is devoted to examining the relations between inference making and foreign language achievement. The establishment of these relations was the ultimate objective of the project. Despite the fact that the project had to concern itself with intermediate objectives (with the development of inference eliciting techniques and instruments for measurement) some suggestive data were collected and a number of tentative conclusions can be made. It is anticipated that a more sophisticated scoring of the Visual Inference Test may at a later date be incorporated with other available measures to provide a more complete analysis of the relations between inference making and foreign language achievement and to provide additional information on the effect of the treatment. For the present report, however, a number of relevant fragments are available.

Three lines of evidence will be examined: a) the relations between inference making and foreign language achievement; b) the effect of the experimental treatment; and c) the data on how students used context cues. The data that seem to remain methodologically defensible relevant to these three issues will be presented.

The Samples

The samples were students of French in the junior high school grades at the suburban schools in the vicinity of New York. As noted previously, these were middle class suburbs. Students came from homes which enjoyed physical comforts and many cultural amenities. The orientation of the communities and the school system was toward high academic achievement. Few, if any of the pupils in the sample were not college-bound. Table 3 presents data available on the levels of intelligence, aptitude and achievement of the students.

TABLE 3

Numbers of Cases, Means, and Standard Deviations of Project Groups on Standard Intelligence and Aptitude Measures

Class (Project Code No.)	Grade	Otis			DAT[a]									SCAT-Total[b]		
					Spelling			Verbal			Sentence					
		N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
A. Data collected in 1964																
02	9th	16	129.63	6.25	16	88.69	15.14	16	94.38	5.68	16	94.56	8.23			
03	9th	17	123.94	7.54	18	79.50	16.95	18	85.72	20.53	18	84.17	10.78			
04	8th													29	293.79[c]	7.88
B. Data collected in 1965																
44	9th	22	123.91	7.06	22	74.86	24.48	21	87.38	8.89	21	82.71	10.26			
52	9th	24	115.50	8.85	24	65.21	22.83	24	70.62	21.57	24	70.83	17.66			
53	9th	26	122.42	9.15	25	90.36	11.88	25	88.88	13.98	24	90.08	10.17			
21 and 20	8th													43	96.38	4.92
31 and 30	8th	49	128.14	6.05	50	86.04	16.21	50	89.76	9.89	50	91.74	11.08			
42	8th	22	126.50	7.37	21	83.29	21.38	21	88.24	13.78	21	92.57	9.66			
61	8th													26	89.13	9.70
82	8th													25	90.30	11.39
83	8th													26	84.46	13.60
11 and 10	7th													38	97.33	28.22
40	7th	15	126.07	8.09												
41	7th	18	126.67	6.96												
50	7th	15	122.73	6.06												
51	7th	18	123.44	6.79												
60	7th													26	88.83	13.76
70	7th													23	90.39	8.68

---

[a] Percentile scores according to national norms.

[b] Unless otherwise indicated, these are percentile scores according to national norms.

[c] This mean of converted scores is equivalent to the 96-98 percentile band of the national 8th grade sample for this test.

I. Relations between Inference and Foreign Language Achievement

Several types of data relevant to establishing the relationship between inferencing and foreign language achievement were collected. Diferent sets of measures were obtained from various groups. The tables presenting these data by groups show whatever relevant measures were available. The measures described below were each obtained from at least some of the groups studied and used in computing correlations.

Measures of Inference

a) Teacher's Ratings. Teacher's ratings were obtained on several scales of pupil behavior. Ratings were assigned on five-point scales and the number of cases to receive each rating were specified to the teacher on the basis of the numbers of students on this teacher's roster. In this manner normally distributed data for each teacher -- across his total number of students -- were obtained. Rating procedures were discussed at length and a "Bias Check List" (see Appendix C) was presented to point out possible sources of "halo effects" and to help the teacher approach the task with as objective a frame of mind as possible. The instructions to teachers for ratings on these scales are given below. The shortened designations in parenthesis are the designations of those variables in the statistical tables which follow.

(1) Willingness to Make Inferences. (Inference Willingness Rating)

"In rating students on this scale, consider (a) the number of times a student raises his hand to offer an inference, and (b) the promptness with which he attempts an inference while he is in the midst of a recitation, or when you attempted to lead him up to an inference. Ratings on the low end of the scale are to be assigned to students who seem to be afraid of making inferences and who resist doing so. This scale does not measure the accuracy of a student's inferences; merely his willingness to make inferences irrespective of his ability to make them.

> "In the experimental groups it may well be (indeed, it is hoped) that many students have become more willing to make inferences as the school-year progressed. Please assign your ratings on the basis of the most recent observations of your students' behavior. Since the scaling system calls for rating students in relation to each other, it is irrelevant whether one student increased in his willingness to make inference more than another one did. What is called for is merely the present relative status of each of your students."

A definition of inference was supplied to the teachers of control-group classes.

(2) Relative Frequency of Correct Inference. (Inference Correctness Rating)

> "On this scale, students are to be rated on the ratio of the number of correct inferences to the gross number of inferences the student makes. Thus, this scale is a measure of the student's ability to make inferences ... Note ... [that willingness to make inferences] measures a general rate of responding while [this scale] measure[s] the frequency the student is right relative to his own rate of responding."

(3) Verification of Inferences (Inference Verifications Rating)

> "Verification will be defined as the process by which an inference is checked against additional data. For example, a pupil may see the French word delicatesse and infer that it means 'delicatessen' in English. Some students will persist in this notion without examining the context in which the word occurs and will thus fail to verify their inference, while others may carefully explore the context in which the word occurs, ask for, or look for additional information, and consider other factors before even attempting an inference. Others will indicate their tentativeness about the inference they make, if even only by their tone of voice.
>
> "It is logically possible for a student who is very willing to make inferences to be very careful about the inferences he makes and try to verify each of them. It is for this reason that there is no necessary connection between willingness to make inferences and verification."

(b) Cloze Tests. (Cloze I and Cloze II) Two tests of Cloze procedure (see Chapter VII) were administered both as didactic devices and measures of inference making. These tests are replicated in Appendix B . Two scoring keys were set up for scoring each test. The first was an "acceptable key" (Cloze Acceptable) which included as right responses words that seemed to be good answers in the estimation of a number of raters who examined them and which added to the index of internal consistency of the test when they were included. The second was an "identical key" (Cloze Identical) which included only the words supplied by the author of the passage, although a few of these proved actually to be somewhat idiosyncratic. In addition, students were asked to indicate whether they were "sure", "neither sure nor unsure" or "unsure" about their responses (Cloze Certainty Ratings). These certainty ratins were scored 2, 1, and 0 respectively.

Measures of General Ability

Measures of general ability were included to provide an indication of the extent to which various aspects of inference making are related to general ability. Further, it is conceivable that teachers' ratings of inferencing may be inordinately highly correlated with their ratings of general ability. Such correlations would imply confounding and suggest reservations concerning the results.

(a) Teacher's Ratings.

(1) Brightness Ratings. "We will define brightness for our purposes as rapidity and quality of mental functionings. A bright student is one who catches on to concepts quickly. Consequently a bright student will have more concepts at his command. Further, when concepts increase in complexity, only the brightest students will be able to master them.

"A bright student will be able to cope simultaneously with a relatively large number of factors. He will perceive relationships easily, and, provided he has adequate knowledge, he will solve problems rapidly and adequately. He will be infrequently confused unless he has a marked tendency to attempt to cope with material of greater complexity than he is prepared for.

"Although it may be that brighter pupils are probably more verbal and better informed than less bright ones, you are asked to try to disregard knowledgeability and verbalness in making your ratings. Try to keep in mind that verbalness may also be deceptive and that the glib student often merely chances upon the correct answer."

(2) Language Aptitude (Language Aptitude Rating). "On this scale, please give your estimate of the ability of each pupil to learn to understand and produce a foreign language in both the auditory and written modes. Aptitude for the four language skills are to be mixed together in making ratings on this scale, in order to reduce the tediousness of assigning ratings on many more scales. If you should feel inclined, however, to assign ratings on four separate scales (aptitude for learning to listen, speak, read, or write), please use the blank columns on the right side of the rating sheets."

(c) Intelligence Measures (Otis IQ, SCAT Total). When available, data from standard intelligence and aptitude tests were correlated with the other measures. Scores on the Otis Quick Scoring Test of Mental Ability or on the School and College Aptitude Test (SCAT) were available. SCAT total scores were used.

Measures of Foreign Language Achievement

(a) Final Grade in French.

Some teachers supplied final grades in French. These scores were two digit numbers ostensibly ranging from 1 to 100 but effectively ranging between 50 and 100.

(b) Standard Achievement Tests (MLA LISTEN, READ, SPEAK)

The Modern Language Association Cooperative Classroom Tests in French, Lower Level Form A, Listening, Reading and Speaking were administered to as many students in as many groups as possible.

Results

The measures listed above were inter-correlated in sub-groups. Since teachers' ratings cannot be assumed to be based on perfect consensus in interpreting the scales, the largest sub-group was a teacher. In most instances, the data were further broken down by class because of variations in the batteries or similar irregularities.

Tables 4 and 5 are examples of correlation matrices obtained in this manner. Additional tables may be inspected in Appendix D .

TABLE 4

Intercorrelations among Measurements of Inference-Making, General Ability and Foreign Language Achievement
Class 53

Rockville Center Class 53 - Grade 9-2		V A R I A B L E S															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Inference Willingness-Rating	1	100	100	100	60	60	48	44	12	35	78	74	70	68	64	53	10
Inference Correctness-Rating	2		100	100	60	60	48	44	12	35	78	74	70	68	64	53	10
Inference Verific.-Rating	3			100	60	60	48	44	12	35	78	74	70	68	64	53	10
Cloze I - Acceptable	4				100	81	51	49	20	16	66	36	63	41	32	39	18
Cloze I - Identical	5					100	43	48	34	01	56	42	84	47	28	42	02
Cloze I - Certainty Ratings	6						100	37	23	75	33	12	43	32	23	38	01
Cloze II - Acceptable	7							100	59	13	49	41	57	40	35	51	06
Cloze II - Identical	8								100	03	34	33	45	29	16	10	29
Cloze II - Certainty Ratings	9									100	04	14	21	09	15	11	08
Brightness - Rating	10										100	77	57	70	61	60	16
Language Aptitude - Rating	11											100	51	79	68	55	17
Otis IQ	12												100	48	38	38	13
Final Grade in French	13													100	84	77	61
MLA - Profic.-Listening	14														100	75	60
Reading	15															100	56
Speaking	16																100
N		25	25	25	22	22	22	25	25	25	26	26	26	26	25	25	21
$\overline{X}$		2.96	2.96	2.96	23.00	12.27	39.18	25.76	14.88	41.60	3.35	3.23	122.42	84.27	33.64	33.68	44.05
σ		0.88	0.88	0.88	4.58	3.82	10.61	3.01	3.76	13.34	0.78	0.70	9.15	7.48	5.78	7.59	9.63

N = 20

for n = 21 $p = .05$ when $r \geq 42$
$p = .01$ when $r \geq 54$

for n = 26 $p = .05$ when $r \geq 38$
$p = .01$ when $r \geq 49$

Decimal points are omitted in correlations.

TABLE 5

Intercorrelations among Measurements of Inference-Making, General Ability and Foreign Language Achievement
Class 42

Rockville Center Class 42 - Grade 8-0	VARIABLES															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Inference Willingness-Rating 1	100	44	59	50	18	30	13	15	18	74	72	26	68	44	39	35
Inference Correctness-Rating 2		100	85	26	11	02	20	24	23	66	63	05	74	73	75	51
Inference Verific.-Rating 3			100	31	13	03	44	20	17	84	81	23	82	84	82	62
Cloze I - Acceptable 4				100	69	-08	28	33	37	41	29	37	36	01	02	21
Cloze I - Identical 5					100	-09	35	19	-29	21	03	41	16	03	06	10
Cloze I - Certainty Ratings 6						100	25	11	65	08	04	03	01	01	41	26
Cloze II - Acceptable 7							100	65	27	23	32	27	27	40	24	33
Cloze II - Identical 8								100	36	02	04	49	04	30	13	85
Cloze II - Certainty Ratings 9									100	06	03	07	07	25	29	49
Brightness - Rating 10										100	90	29	91	63	75	57
Language Aptitude - Rating 11											100	41	92	70	75	61
Otis IQ 12												100	37	24	31	40
Final Grade in French 13													100	81	86	74
MLA - Proficiency-Listening 14														100	81	94
Reading 15															100	76
Speaking 16																100
Largest N	18	18	18	17	17	17	17	17	17	18	18	22	18	13	14	10
$\bar{X}$	2.67	2.89	2.83	25.71	15.59	40.76	26.29	13.88	43.41	2.67	2.72	126.50	81.50	26.15	26.21	38.60
σ	0.94	0.99	0.90	2.91	3.24	9.88	2.91	2.37	11.74	0.88	0.93	7.37	8.57	8.14	6.70	7.62

N = 20: P = .05 = .423
P = .01 = .537

for n = 10 p = .05 when $r > 60$
p = .01 when $r \geq 74$

for n = 22 p = .05 when $r \geq 41$
p = .01 when $r \geq 53$

Decimal points are omitted in correlations

Since the data were collected over a rather long period of time, there were losses in the numbers of cases and a computational program for unequal numbers of cases was used. The maximum number of cases for each variable is given in the tables, but the actual number of cases for the correlation in any cell is the smaller number for the pair of variables applicable to that cell. The means and standard deviations are for the maximum number of cases for each variable.

Inspection of the tables permits the following generalizations. First, that teachers' assessments of general ability and of inference making were positively related to foreign language achievement as measured both by teachers' ratings and standard tests. Further, general ability measured by tests and Cloze measures seem to be related. This finding is in accord with many research findings on Cloze procedure. The extent to which Cloze procedure is a good measure of inference awaits validation against a more refined measure, such as the Visual Inference Test promises to become. The magnitudes and patterns of correlation indicate that it is possible that inference making contributed to foreign language achievement independently from the contribution of general ability. This suggestion requires verification based upon larger samples of data and statistical analysis using multiple correlation techniques.

Certain reservations about these data are to be noted. First, it may be seen that some teachers did not distinguish between "willingness to make inferences" and "frequency of correct inferences." Data provided by the Visual Inference Test suggests the contrary. Second, teachers frequently seemed to have considered "language aptitude" and "brightness" to be of a single piece. Final language grades seem to have been strongly influenced by assessments of students in respect to these dimensions or vice versa. On the other hand, teachers' grades and teachers' assessments of pupils exhibit respectable correlations with objective measures, where these are available. Thus, teacher judgments are certainly valid to some extent, and may be more valid in respect to some dimensions which can be judged only over long periods of time.

II. Effectiveness of the Experimental Treatment

For a number of reasons direct comparisons between experimental and control groups proved to be inadmissible. School systems did not follow the same testing programs and there were considerable discrepancies among available control data. Control groups for some experimental classes had not been identified. Close examination of classroom activities revealed diversities in the number of minutes of actual instruction, classroom procedures, and in the total range of curricular materials used. (Many of the discrepancies emerged from the examination of classroom protocols.) It is felt at present that these discrepancies are not likely to be averted unless large samples of classes are used. Large samples could not have been managed and would not have been appropriate to an exploratory study of the type described here. The essential value of the control data lay in the analysis reported in the first section of this chapter and in supplying adequate numbers of cases for the development of measurements.

Some comparisons over fairly constant conditions did remain possible. MLA Cooperative Test Scores for Listening and Reading were available for two teachers of ninth grade pupils. Each teacher completed the second level of the A/LM Curriculum with one group in May 1964, before the project was initiated, and with another group in May 1965, at the end of the experimental treatment. Listening scores were available for a similar comparison for one teacher of eighth-grade pupils completing the first level of the same curriculum. The means and standard deviations for these test scores together with available control data known to be highly correlated with foreign language achievement are shown in Table 6 .

The table implies that for Teacher "A" introduction of the inference method was correlated with a marked increase in foreign language achievement test scores. This increase occurred

TABLE 6

Numbers of Cases, Means and Standard Deviations on Foreign Language Achievement Tests and "Control" Tests for Classes of Three Teachers in 1964 and 1965

Year	MLA-Classroom F.L. Proficiency						OTIS			Differential Aptitude Tests									SCAT		
	Listening			Reading						Spelling			Verbal			Sentences			Total		
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
A. Teacher "A" Ninth Grade - Second Level French																					
1964	18	27.72	7.72	17	28.18	7.14	17	123.94	7.54	18	79.50	16.95	18	85.72	20.53	18	84.17	10.78			
1965	25	33.64^a	5.78	25	33.68^c	7.59	26	122.42	9.15	25	90.36^c	11.88	25	88.88	13.98	24	90.08	10.17			
B. Teacher "B" Ninth Grade - Second Level French																					
1964	16	34.50	4.23	16	35.31	7.33	16	129.63	6.25	16	88.69	15.14	16	94.38	5.68	16	94.56	8.23			
1965	22	32.68	5.72	22	33.50	4.73	22	123.91^b	7.06	22	74.86^c	24.48	21	87.38	8.89	21	82.71^a	10.26			
C. Teacher "C" Eighth Grade - First Level French																					
1964	27	22.52	6.70	27	20.59	5.35													29	96-98^e	-
1965	23	16.13^b	6.18	(22	20.00	6.54)^d													26	89.13	9.70

[a] Difference between means of successive year significant at .001 level.

[b] Difference between means of successive year significant at .01 level.

[c] Difference between means of successive year significant at .05 level.

[d] Data collected in high school in November of the succeeding academic year.

[e] Percentile band extrapolated from mean converted score which equaled 293.79, S.D. = 7.88.

concomitantly with the fact that the experimental group consisted of students whose intelligence level was similar and whose aptitude scores were statistically significantly higher than the students of the class that preceded the experiment. For Teacher "B" there was an inconsequential loss in achievement test scores accompanied by marked inferiority of the experimental group in respect to the control variables. Teacher "C's" class subjected to the experimental treatment was markedly inferior on the Listening Test to the class taught by this teacher prior to the experimental treatment. Control data on the same metric were not available for the two classes. By an admittedly less-than-rigorous adjustment of a mean raw score to a percentile, an indication was found that the experimental group may have been markedly inferior. In general, the comparisons imply that improvements in achievement occurred in the classes of one teacher and that decrements may have occurred concomitantly with decrements in the "quality" of the students.

The findings remain equivocal as to whether the changes may be attributed to the inference method, to Hawthorne effects or to other unidentified antecedent conditions. It is presumed that no change other than the inference method was introduced during the experimental period, but factors as recondite as changes in the personal lives of teachers can play a role. Final verification awaits a test of the hypothesis on a larger scale.

For technical reasons of school administration, Teacher "C" could not administer the MLA Listening Test in May 1965. In November 1965 those students who should have been tested during the preceding spring were tested at their high school together with classmates from a large number of feeder programs. Analysis of variance comparing these students with all the other students revealed no significant differences. If students from the inference group had proved superior to their classmates in a school program after three months of additional training, the results might have implied that the inference method does facilitate subsequent foreign language study.

The mean of 20.00 for the MLA Reading Test for Teacher "C's" 1965 group was obtained from students' scores at the November re-testing. Another group which participated in the November re-testing had a mean of 26.25 on the Reading Test in May and 29.03 in November, or a gain of 2.78 points due to the additional training (and experience with the test form). If it may be assumed that the mean on the Reading Test for Teacher "C's" 1965 group would have been about 16, or slightly lower (since Reading and Listening means are frequently close to each other, since scores on these tests are highly correlated, and since Teacher "C's" group seems to have been better in Listening than Reading), we might have expected a mean of about 19 in the November re-testing. The mean of 20 is thus very slightly higher than expected. These rough and tentative extrapolations suggest possible later gains due to inference training or irregularities in the May testing for Teacher "C's" 1965 group.

III. Evaluation of Lesson on Context Cues

The materials that comprised the independent variable of the sub-study reported here were described in Chapter VII and taught at three class periods by Mrs. Nancy Magaud. These materials comprised a series of lessons on the use of context cues. The purpose of the evaluation was to discover whether the lessons in question improved the competence with which students inferred meanings of unknown words from reading passages.

The Instrument

Two versions of the same form of instrument were prepared for this study to supply pre-test and post-test measurements. Each instrument, which was itself comprised of a pre-test and a post-test, is reproduced in its entirety in Appendix E .

The testing procedure first required pupils to supply the English equivalents of a list of 50 French expressions and words, the Vocabulary Test. The response sheets were then collected and a simple reading passage (chosen from "Sélection" the French version of the Reader's Digest) was presented, the Reading Test.

The 50 expressions of the Vocabulary Test were all included in the passage. In order to help students focus on the context supplied by the passage, a set of reading comprehension questions accompanied the passage, the Questions on Reading. After the comprehension questions were answered, the Vocabulary Test was re-administered. Students were free to consult the Reading Passage in responding to the Vocabulary Test on the second trial. This instrument was devised to measure how much vocabulary a student could acquire from a reading passage. The major purpose of the studey was to discover how much a student could learn to acquire from the lessons presented to them.

Two experiments were conducted. In one experiment Form A of the instrument was used as the pre-test and Form B was used as the post-test. In the second experiment the order of pre-test and post-test was reversed. Two different classes at Rockville Center served as the experimental groups in each experiment, receiving the lessons on context cues between the pre-test and the post-test. Classes at Scarsdale Junior High School served as control groups. (Since these classes were considered to be in the experimental groups of the Inference Project, they were taught the context cue lessons after taking the post-test.) The two experiments were not perfect replications of each other because in one of them the post-test for the control group was administered without the first presentation of the Vocabulary Test. This error in the execution of the study provided the opportunity, however, for making some conjectures about the function of the test instrument as a didactic device.

Scoring

The scores on the Vocabulary Tests were used as the data for this study. Each item was scored for only one predetermined unit, although some items in the test lists contained additional grammatical and descriptive markers, which were provided to delineate the meanings of the scored unit. Credit was given for English equivalents that were near enough to provide a reasonable reading of the text, even if designations of the grammatical text were incorrect. All scoring was double-checked for consistency against a scoring key which expanded slightly as scoring progressed.

English equivalents were established with reference to the context of the reading passage. Since the objective of the study was to determine the role of context in the acquisition of vocabulary, words with several possible English equivalents were given credit only if the equivalent was appropriate to the reading context.

In view of the fact that a tendency to make inferences exclusively on the basis of cognates had been observed in the classroom, it seemed interesting to study the effect of the context cue lessons on possible wrong inferences. Since a student who is inferencing always has the option to omit a response and since an omission is appropriate behavior where cues are contradictory, it was felt that improvement in inferencing should be assessed both in terms of increments in correct responses and decrements in incorrect responses.

Analysis of the Data and Results

Although the operationalization of the dependent variable in this experiment would suggest pre-and post-test comparisons of changes in difference scores (between two administrations of the same vocabulary tests), this measurement was not used in the main analysis for two reasons. First, difference scores compound error variance of two measurements. Second, although considerable attention was given to preparing Vocabulary Tests and Reading Passages of comparable difficulty, there was no assurance that the tests were equivalent. Later inspection of the data revealed that comparability had not been achieved. Since both the Reading Passage and the Vocabulary Test may effect differences, it would be impossible to ascertain whether the instrument or the training accounted for any statistically significant effects that might be found.

Given the limitations of organizing a study of this kind in school settings, the most appropriate statistical treatment for ascertaining the effects of the "context cue" lessons seemed to be analysis of covariance. In these analyses the scores on the second administration of the Vocabulary Test on the pre-test was used as the control variable, and the scores on the second administration of the Vocabulary Test on the post-test was considered the experimental variable.

Table 7 shows the analyses of covariance for right responses and for wrong responses, pre-test means, post-test means, and adjusted post-test means for the experimental and control classes in which Form A of the instrument was used as the pre-test. These were the classes in which the procedure was followed according to plan and all the vocabulary tests were administered.

The results of this first experiment indicate that the experimental group was initially the superior group both in respect to having more correct responses and fewer incorrect responses. After the treatment the difference between the two groups was even more marked in respect to right responses. In respect to rights, the post-test was easier for the experimental group and harder for the control group. The co-variance adjustment magnified the difference. In respect to wrongs, however, the analysis of covariance showed no statistical significance and provided an adjustment between the groups that compensated for the original superiority of the experimental group. It would imply that the treatment did not effect incorrect responses.

Table 8 provides for the second experiment the same data Table 7 provided for the first experiment. This was the

TABLE 7

Analyses of Covariance for First "Context Cues" Experiment

A. Right Responses

Source	df	MS	F	
Among means	2	1494.97		
Within groups	38	181.24	8.248	p < .01

	Control Group	Experimental Group
Pretest (control variable) mean	14.84	20.41
Posttest (experimental variable) mean	8.05	32.41
Adjusted posttest mean	3.84	28.97

B. Wrong Responses

Source	df	MS	F	
Among means	2	35.66		
Within groups	38	45.96	.78	NS

	Control Group	Experimental Group
Pretest (control variable) mean	22.26	14.36
Posttest (experimental variable) mean	19.37	13.09
Adjusted posttest mean	17.11	15.03

TABLE 8

Analyses of Covariance for Second "Context Cues" Experiment

A. Right Responses

Source	df	MS	F
Among means	2	495.88	
Within groups	38	15.21	32.60 $p < .01$

	Control Group	Experimental Group
Pretest (control variable) mean	14.14	14.65
Posttest (experimental variable) mean	15.90	23.25
Adjusted posttest mean	16.09	23.06

B. Wrong Responses

Source	df	MS	F
Among means	2	382.30	
Within groups	38	56.25	6.80 $p < .05$

	Control Group	Experimental Group
Pretest (control variable) mean	22.33	25.00
Posttest (experimental variable) mean	12.71	19.80
Adjusted posttest mean	13.15	19.34

experiment in which *Form B* of the instrument was the pre-test, *Form A* was the post-test, and in which the *Vocabulary Test* was omitted prior to the *Reading Passage* on the post-test.

The data for the second experiment reveals that the experimental and control groups were rather closely matched on the pre-test measure of right responses and that the experimental group was slightly inferior (having a higher mean) on the pre-test measure of wrong responses. The experimental treatment seems to have yielded a statistically significant improvement in *Vocabulary Test* scores. Data to be described below, however, indicate that the improvement cannot be attributed to the acquisition of correct meanings from context. On the other hand, the desired decrement in wrong responses occurred in the *control group*. Since this latter effect was not noted in the previous experiment, it is reasonable to attribute it to the variation in the testing procedure. It is as though presentation of the *Vocabulary Test* prior to the reading passage enhances the undesirable tendency for students to focus entirely upon cognate relations and makes adjustment to context all the more difficult. In the control group, where the initial *Vocabulary Test* on the post-test was omitted there were fewer wrong responses, despite the fact that this group was less adept at extricating correct meanings. This finding, if replicable, is of considerable significance for teaching and re-emphasizes the importance of context for inferencing and training to re-adjust early inferences.

Thus far in the analysis, an assumption was made to the effect that gains in the experimental group were attributable to improvement in the ability to make use of context cues. Despite the shortcomings discussed above, examination of differences in scores on the *Vocabulary Tests* between first and second administrations should provide corroboration for this assumption and provide also improved insight into the effect of context cues on inferred meanings. Table 9 shows means and standard deviations for rights, wrongs, and omitted responses for all administrations of the Vocabulary Tests.

Examination of Table 9 reveals first that Vocabulary Test A was generally easier than Vocabulary Test B. Gains in rights after reading the passage of Vocabulary Test A were negligible. Sometimes there were losses.

It is to be noted that in the second experiment,where Vocabulary Test A functioned as a post-test, there was no change in the means on the Vocabulary Tests before and after the reading passage. The significant result of the experiment can no longer be attributed to the fact that the treatment improved students' ability to use context cues. The significant difference may still be interpreted as improvement due to an ability to make inferences (from cognates however, and not from contexts), provided that no violations of the assumptions of covariance are also implied.

Vocabulary Test A exhibits frequent instances of decreases in wrong responses with accompanying increases in omitted responses. It is as though the passage supplied only a few context cues which pointed to errors in original inferences from cognates, but which failed to suggest new meanings. It was a poor passage for testing the hypothesis in question.

Vocabulary Test B, while apparently more difficult than Test A, reveals in all groups increases in right responses after the passage was read. The gain was most marked in the class where it was used as a post-test after the context cues lesson. This is clear corroboration of the findings by means of analysis of covariance. Wrong responses decreased also after reading the passage in Vocabulary Test B accompanied partially by an increase in omitted responses, but also by increases in right responses.

Means and Standard Deviations of Vocabulary Test Scores in "Context Cues" Experiments

EXPERIMENT I

	Class W - Experimental - N=22				Experimental - N=22			
	Form A as Pretest				Form B as Posttest			
	1st Administr.		2nd Administr.		1st Administr.		2nd Administr.	
	M	S. D.	M[a]	S. D.	M	S. D.	M	S. D.
Rights	22.18	3.89	20.41	7.07	14.91	3.98	32.41	6.5
Wrongs	22.55	5.26	14.36	6.42	27.86	6.24	12.41	4.0
Omits	4.82	5.66	12.95	8.59	7.23	6.39	5.14	5.1

	Class X - Control - N=19				Control - N=22			
	Form A as Pretest				Form B as Posttest			
	1st Administr.		2nd Administr.		1st Administr.		2nd Administr.	
	M	S. D.	M	S. D.	M	S. D.	M	S. D.
Rights	13.68	2.70	14.84	3.93	6.79	2.29	8.05	3.6
Wrongs	25.68	7.57	20.37	8.19	27.16	10.85	18.84	10.1
Omits	10.63	5.29	14.79	9.28	16.05	11.67	23.11	10.9

EXPERIMENT II

	Class Y - Experimental - N=20				Experimental - N=20			
	Form A as Posttest				Form B as Pretest			
	1st Administr.		2nd Administr.		1st Administr.		2nd Administr.	
	M	S. D.	M	S. D.	M	S. D.	M	S. D.
Rights	23.25	2.88	23.25	4.40	11.45	3.22	14.65	3.29
Wrongs	22.45	3.56	19.80	4.42	26.30	6.10	25.00	6.35
Omits	4.30	3.57	6.95	4.88	12.25	6.89	10.35	6.90

	Class Z - Control - N=21				Control - N=21			
	Form A as Posttest				Form B as Pretest			
	1st Administr.		2nd Administr.		1st Administr.		2nd Administr.	
	M	S. D.	M	S. D.	M[a]	S. D.	M	S. D.
Rights	Missing[b]		15.90	5.90	9.14	4.04	14.14	4.68
Wrongs	"		11.57	9.54	30.38	8.84	22.33	9.83
Omits	"		22.52	11.66	8.10	8.73	13.52	11.81

[a] Includes case not responding to test.

[b] First administration of Vocabulary Test omitted.

It is reasonable to assume that Vocabulary Test A contained more cognates than Vocabulary Test B since scores were initially markedly higher (and since the glossaries of the curriculum had been checked for the items on the list). With such items, context cues seem to have been of little use to students. On the other hand, when the words on the test were equivalent to blanks, students made good use of context. This interpretation must be made with reservations since the cue values of the passage and their comprehensibility to students were not studied, and since there is the possibility that only a limited number of words in a passage can be inferred and that these were merely inferred through cognates in Vocabulary Test A. Nevertheless, the results are in accord with the general observation of this study that cognates as a sole source for inferencing seem to have a salience for students that may interfere with their ability to use additional cues and to corroborate their inferences.

The data in Table 9 also imply adjustment to additional information. The number of omitted responses did not automatically decrease with additional information when the information was complex. The study of the Visual Inference Test revealed that under different circumstances, students would guess more recklessly. It would seem that students are able and willing to search contexts to make inferences and to adjust to new information, but that they do this best under certain circumstances and/or after proper guidance.

The general conclusion to be gained from the entire evaluation described here is that while inferencing is related to general ability, its relation to foreign language achievement may be enhanced by training. The conclusion is advanced tentatively since the evaluation was merely a pilot study and not a rigorously controlled experiment.

Chapter XI

SUMMARY AND PROSPECTS

This report concludes with an attempt to assess the degree to which the Project achieved its objectives and with considerations of guidelines for further development of the theme of the Project.

The ultimate goal of the work on inferencing reported here is the test of the hypothesis that inferencing enhances foreign language achievement. A number of intermediate aims, however, became the objectives of the exploration reported here. These were:

(a) The development of the inference method;

(b) The development of techniques for communicating the method to students;

(c) The development of materials for preparing students to make inferences in French;

(d) The development of measurements for determining what occurs in the classroom by way of imparting inference procedures to students; and

(e) The development of measurements of inference behavior.

The specification of inference behavior as an "educational fiction," that is to say, a complex of psychological processes organized into a problem solving strategy, was successful. Some of the difficulties in interpreting the strategy have been identified and procedures for overcoming them were devised. It is not an overstatement to say that the Project has completed the preparation of an adequate description of inferencing that can be communicated to foreign language teachers so that they can attempt to develop it and recognize it when it occurs in students. While it may have seemed that the Project was prepared to do this at the outset, it must be admitted that the encounter with teachers revealed the falsity of this assumption and contributed very substantially to the further refinement and clarification of the process.

The project has made considerable progress in working out procedures and techniques for developing inferencing in students, but this objective may be said to have been only partially achieved. This exploratory project conceived of the teacher as the medium for imparting inference behavior to students. This attack proved to be well-advised, since the contribution of teachers was substantial, and since the ultimate test of any educational innovation is its effectiveness in school settings despite the vicissitudes of these settings.

Yet it is not known whether an approach by means of programmed instruction or other non-teacher mediated techniques might not have been more effective. Nor is it known whether the workshop training of teachers accomplished more than a broadening of the intellectual horizons of a group of vigorous teachers who would have grown as much, or more (perhaps in other directions) had they not encountered the Inference Project. The workshops focused attention on inferencing and imparted knowledge about the concept. But to what extent did these sessions alter the competence of teachers as trainers of inference behavior? It is known that some progress was made, but it is not known how much, nor were any indications gathered about how much progress is possible.

The technique suggested in Chapter V of providing teachers with protocols of their own classroom procedures, accompanied perhaps by models of desired procedures, and using a vocabulary specifically developed for analyzing classroom behavior (the taxonomy of Chapter VI) seemed promising. The complete development of this technique, it would seem, really warrants an entire project, larger than the Inference Project. Thus, while the try-out of the procedure was less than systematic in the present project, it seems that substantial progress was made toward preparing a procedure that could be used in later stagings of the Inference Method. It is proper to recommend, however, that considerable additional research and development be completed on this proposed approach to the behavior of teachers in the classroom before attempting to use it in another project.

The progress in developing materials for preparing students to make inferences in French was adequate to call the present Project a staging of the inference method. At the conclusion of the Inference Project all who were involved in it were struck by the immense possibilities for doing more. The dissemination in compact and usable form of those materials that were developed remains a responsibility of the investigators.

The development of measurements of what occurs in the classroom during the implementation of a project was tied in with the procedure of implementing the innovation, that is, the taxonomy of teacher behavior in the foreign language classroom. This procedure for observing behavior is yet to be tested for its reliability and its power to discriminate changes resulting from the training of teachers. Further, experiences with it on the present Project proved it to be in want of considerable streamlining.

The rudimentary form of the Visual Inference Test was useful in extending the understanding of the inference process achieved by the Project. It seems, moreover, that this test warrants further development. Perhaps the test can be used in its present form for testing hypotheses about changes in inference behavior due to training. Its general usefulness, as a measure of various aspects of inference behavior and its correlates, however, would be restricted without further research.

The present project partially tested the hypothesis that inferencing would enhance foreign language achievement. The evaluation improved the analysis and understanding of the inference process. The results generally pointed to a confirmation of the hypothesis that inferencing does enhance foreign language achievement, but the rival hypothesis have by no means been obviated. The confirmation is adequate, however, to justify the further developments outlined in this chapter. An eventual staging of the Inference Method with a more rigorous evaluation of its effectiveness also seems warranted.

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APPENDIX A

APPENDIX A

NON - INFERENCE ELICITATION MOVES

1. MIXTURE OF FRENCH AND ENGLISH
2. ELICITATION BY "TESTING"
3. ELICITATION OF TEXT PHRASES

----

1. MIXTURE OF FRENCH AND ENGLISH

a) O.K. Now if I ask you this question, comment trouves-tu, comment trouves-tu le livre ? Comment trouves-tu le livre ? How did you answer that : comment trouves-tu le livre ?

Il me plaît beaucoup.

b) Mais où peut-on rencontrer des jeunes filles alors ?

Very nice. Mais où peut-on rencontrer des jeunes filles alors, ... now you know the answer. Mais où peut-on rencontrer des jeunes filles alors ? .... And of course, rencontrer means to encounter, to meet, now Alice is asking the following question. Où un français, où un français rencontre-t-il ses amis ? Où un français rencontre-t-il ses amis ? What did I want to know then ? Où un français rencontre-t-il ses amis ? Sonia ?

c) Vous avez le journal.

Tu as le journal,

Donnez-moi le contraire de "tu as le journal"; give me the opposite of "tu as le journal", Mimi ?

Vous avez e..

Vous avez le journal. Now, if I speak, if I, the second sentence I say : vous avez, what am I saying then, Deborah ?

I have

2. ELICITATION BY "ENGLISH"

Qui peut me donner l'article défini masculin singulier,
levez la main et donnez-moi une phrase complète; l'article
défini masculin singulier.
Le livre
Le livre, c'est ça; alors, masculin pluriel
Donnez-moi les livres
Féminin singulier
Donnez-moi la chaise.
Très bien et féminin pluriel ?
Donnez-moi les chaises.
Donnez-moi les chaises. Bon. Ce sont les articles définis.
Bon. Alors, l'article indéfini, masculin singulier, mademoiselle ?
Donnez-moi un garçon
Donnez-moi un garçon ? Non ! c'est un garçon. Très bien.
Masculin pluriel.
C'est des garçons.
Ce sont des garçons, pluriel.
Ce sont des garçons.
Oui, et c'est quel verbe ? Ce sont ? Ca vient de quel verbe ?
Avoir, aller, être ?
être.
Etre. Continuez le verbe être à la forme affirmative.
Je suis, tu es, elle est, il est, nous sommes,
vous êtes, ils sont, elles sont.
Très bien. Sommes-nous une classe ?
Oui, nous sommes une classe
Levez la main.
Oui, nous sommes une classe.
Oui, nous sommes une classe. Très bien. Allons-y. Continuez.
Alors, féminin singulier, pour l'article indéfini. Oui ?
Où est la chaise ?
Bon, très bien et féminin pluriel ?
où est des chaises ?
Où sont des chaises. Pluriel. Etre encore. Alors l'article
partitive. Voici un exemple du partitive. Regardez le
tableau .

3. ELIMINATION OF WHY PHRASES

a) Jean-Luc a tout de suite trouvé un taxi pour nous mener à mon hôtel. Moi, je voulais prendre le métro pour voir comment c'était. Mais Jean-Luc a dit que ce n'était pas une très bonne idée parce qu'on ne voyait rien dans le métro.

Bon. Qui est ce Jean-Luc, Rosette ?

Jean-Luc est le frère de Denise.

Denise est une amie, n'est-ce pas. Bon. Pourquoi est-ce que Jean-Luc a dit que ce n'était pas une bonne idée de prendre le métro ? Stéphane ?

Parce que on ne voyait rien dans le métro.

On ne voit rien dans le métro. Vous êtes allés dans le métro à New-York n'est-ce pas, il fait noir, on ne voit rien. Alors, il vaut mieux prendre un taxi, ou prendre un autobus.

Monsieur, voulez-vous continuer s'il vous plait ?

b) Nous pouvons commencer la lecture. Voulez-vous lire s'il vous plait le premier paragraphe et parler assez haut.

Première journée a Paris. Paris... le 26 avril. ... je viens de passer deux jours formidables à Paris. Il me faut repartir demain matin. C'est bien dommage. Bien sûr, je n'ai pas tout vu; il faudrait des mois et des mois pour tout voir et visiter tout ce qui est intéressant; il faut que je m'arrange pour y revenir bientôt.Mais j'ai au moins la satisfaction de pouvoir dire que je suis allé à Paris que j'avais envie de connaître depuis des années.

Bon. Est-ce que c'est la première fois que la jeune fille va à Paris ? Rosette ?

Oui, c'était la première fois que la jeune fille allait.

C'est la première fois qu'elle va à Paris. Combien de jours est-ce qu'elle a passés à Paris ? Cherry ?

Elle a passé deux jours à Paris.

Quand va-t-elle repartir ?

Elle va repartir demain matin.

(3. elicitation of next phrase)

b) (continued)
Est-ce qu'elle est contente de partir ou est-ce qu'elle voudrait rester plus longtemps, Stéphanie ?

Elle voudrait rester plus longtemps.

Oui. Pourquoi, comment savez-vous qu'elle voudrait rester plus longtemps, quel mot vous donne l'idée qu'elle voudrait rester plus longtemps ? Pierre ?

Parce qu'elle n'a pas tout vu.

Elle n'a pas tout vu, puis elle dit : il faut que je reparte demain, c'est

C'est bien dommage.

C'est bien dommage. Alors, est-ce qu'il faudrait plus de deux jours à Paris pour voir tous les monuments historiques et toutes les choses intéressantes, Gérard ?

INFERENCE CLARIFICATION ROLES

1. By induction - "discovery"
2. By visual cues, gesture, picture, etc..
3. By word analysis cues
4. By types of definition
5. By context cues.

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1. INDUCTION OR "DISCOVERY"

a) Now, I would like you to do a listening exercise.. I am going to read to you a lot of examples of the word "the" expressed in French.. You are going to tell me the different ways the "the" is expressed in French. I would tell you now there are four different words in French when we have only one word in English.

Do you know the technical name of "the" ?

article

What kind of an article ? It's a definite article because it points out something very specific...

Alors écoutez :

Où est le livre ?

Où est le livre ?

Non, non, ne répétez pas, écoutez.

Où est le livre ? Où est la table ? Où est l'orange ? Où sont les livres ? Où sont les tables ? Où sont les oranges ? Je te garde le livre; je te garde le journal; je te garde le papier. Tu veux le pain ? Tu veux le beurre ? Tu veux le dessert ? Tu veux le riz ? Où est la table ? Où est la bibliothèque ? Où est la fenêtre ? Voilà la jeune fille. Voilà la bibliothèque. Voilà la saucisse. Où est l'orange ? Où est l'eau ? Où est l'ami de Robert ? Voilà l'orange. Voilà l'amie de ma soeur. Voilà l'eau. Où sont les livres ? Où sont les cahiers ? Où sont les tables ? Où sont les romans ? Où sont les oranges ? Où sont les amis de Robert ? Je n'aime pas les oranges. Je n'aime pas les amis de ma soeur.

I am going to repeat one short word for you which could, if you're listening carefully, you should be able to get just the information what you need from these examples...

(1. Induction or "discovery" a)

Où est le livre ? Où est la table ? Où est l'orange ? Où sont les livres ? Où sont les tables ? Où sont les oranges ? Now, where is the word expressing the English "the" ? Have you heard ? Several of you have the hands up...

Well, la ou le

All right, when did you hear la ? I am going to write it on the board.

La...

You heard la in what kind of word ?

Les ne

When did you hear la ? Give me an example of when you heard la

La jeune fille.

La jeune fille, but you did not hear me say that. That's correct, but when did you hear me say la ? Let me repeat it then. Où est le livre ? Où est la table ? Où est l'orange ?

...

La table. Now what others words did you hear that express the idea of "the". Jody ?

Les une le

Have you heard le ? With what word did you hear le ?

le.. le

Le livre. Où est le livre ? Is not that what you heard ? Où est le livre ? Où est l'orange ? Où sont les livres ? Où sont les tables ? Où est le livre ? Où est la table ? What others ways did you hear expressing "the" ?

Les.

You heard "les". I would tell you that "les" is spelled this way.. With what word did you hear "les" ?

Les oranges

Les oranges. Did you hear "les" with any other word ?

Les tableaux.

Listen again. Où est le livre ? Où est la table ? Où est l'orange ? Où sont les livres ? Où sont les tables ? Où sont les oranges ?

Les livres, les oranges.

When did you hear "les" Cordy ?

Où sont les livres

Where else did you hear "les" ?

Les romans.

You couldn't hear les romans. I will repeat it for you. Où est le livre, où est la table, où est l'orange, où sont les livres, où sont les tables, où sont les oranges.

Les tables

Les tables. Now, there is another way of expressing "the" that you haven't noticed yet, David ?

L'orange.

What did you hear ?

L'o

L'orange. Did you.... l'orange, où est l'orange. How many

(1. Induction or "discovery" a)

ways do you see of expressing the idea of "the", how many different ways ?
Four.
Four. The four ways are ?Raise your hands and tell me. What are the four ways ?
le, les, la, l
You have to spell it, you can't pronounce it.
l apostrophe.
L apostrophe. O.K.

b) Est-ce que vous pouvez me dire quelque chose, est-ce que vous entendez une différence dans la prononciation, d'abord avec la phrase, la première phrase : nous préférons vivre en Bretagne, vous préférez vivre en Bretagne, mes parents préfèrent vivre en Bretagne, je préfère vivre en Bretagne, tu préfères vivre en Bretagne, ma grand'mère préfère vivre en Bretagne.
Est-ce qu'il y a une différence quelque part dans la prononciation ? Jerry ?
Avec nous et vous il y a accent aigu.
Où, où se trouve cet accent aigu ?
Sur..
Oui, je comprends ce que vous voulez; mais nous nous occupons, nous nous occupons seulement en ce moment avec la dernière voyelle "e" devant la consonne, et puis e-r.
Alors continuez maintenant.

c) - (Student makes false analogy here)
Un beau jour vous serez à l'épicerie, l'épicerie, oui ?
Grocery.
Grocery. O.K. l'épicerie. Can anyone give me the name of another ... l'épicerie ?
La pâtisserie.
Pâtisserie. Bien. On fait des gâteaux chez le pâtissier hein ? Alors, l'épicerie, la pâtisserie, bien ,
Le magasin.
Le magasin, bien; ça c'est le terme général. Oui ?
marché
Le marché aussi, on achète des choses là. Oui ?
Le boulanger.
Le boulanger. Que fait le boulanger ?
The bread, no
Il fait
Il fait
du
Il fait du pain.

(1. Induction or "discovery" c)

Pain. O.K. Le boulanger fait du pain; son magasin s'appelle la boulangerie. Le magasin s'appelle la boulangerie, il s'appelle le boulanger. Alors compris : il s'appelle le boulanger, il a une boulangerie. Comment s'appelle un homme qui tient une épicerie ? Oui ?
L'épicereur.
La boulangerie, le boulanger. L'épicerie,

...

L'épicier, l'épicier.

2. BY VISUAL CUES, GESTURES, PICTURES

a) (showing picture in class, pointing out)
... Alors, Pierre propose à Bernard d'aller faire une promenade en voiture. Voici les voitures, les voitures, et voici les gens qui font une promenade en voiture.

b) (with gesture of hitting someone in the class)
... Qu'est-ce que c'est, faire mal à quelqu'un ?
Par exemple, je frappe Alan, je lui fais mal.
I hurt someone, oui, je lui fais mal.

c) (with picture, plus definition)
... La chose qui est la plus importante de l'architecture romaine, c'est l'arc arrondi, n'est-ce pas ? L'arc arrondi comme ceci. Vous comprenez ? (shows picture)
... Les colonnes, il y a des colonnes mais les colonnes ne sont pas détachées du mur. Voici le mur, et voilà la colonne, tout à fait sur le mur, vous comprenez ?

d) Maintenant, si vous voulez bien (inaudible) passer vos papiers, nous allons discuter un peu. (noise, rustling of papers). Dans quelle région de la France se trouve Marie-Hélène quand elle écrit cette lettre à son père et à sa mère ?
Oui, elle se trouve en Normandie.
En Normandie, oui. Et quelle est la ville en Normandie, de quelle ville était-elle ? Monsieur Charles ?
Charles : elle est (inaudible) dans Rouen.
. De Rouen. Si voulez-vous regarder la carte, n'est-ce pas, au tableau, et nous montrer où se trouve cette ville, où est Rouen ? Vous savez, Le Havre se trouve (inaudible), n'est-ce pas. Voici le Havre et voici Paris et voici Rouen. C'est au mi-chemin... que veut dire mi-chemin, demi-chemin, mi-chemin?
.(inaudible)
.. Oui, c'est entre Paris et le Havre. Vous passez à Rouen quand vous avez vu le Havre et vous pouvez aller à Paris. Comment s'appelle la jeune fille qui écrit ?
. Elle s'appelle Marie-Hélène.

(2. by visual cues, gesture, picture etc..)

e) Je regrette que je n'ai pas un exemple du château-fort, mais je vais le dessiner. Le château-fort appartient au moyen-âge. Moyen-âge, qu'est-ce que c'est que le moyen-âge ? moderne, ancien, moyen..

Moyen, middle-ages

Middle-ages, bon très bien. Au Moyen-âge, vous aviez la féodalité, féodalité, le système de la féodalité, féodalité, n'est-ce pas et vous aviez ce qu'on appelle les châteaux-forts. Les châteaux à ce moment étaient construits pour la défense. Alors vous aviez des gros murs, n'est-ce pas, des murs épais qui entouraient le palais, le château, et la cour, la cour d'honneur. Autour de ce château, il y avait de l'eau, il y avait un pont-levis, un pont-levis, qui partait du château et allait jusqu'à la cour, qu'on levait, n'est-ce pas, pour la protection; et quand on le descendait, c'était parce que les gens voulaient sortir du château dans la cour. Bon. Sur ces murs qui étaient très très épais on s'arrangeait pour la défense. Certainement il y avait des créneaux. Voici les créneaux. Comprenez-vous les créneaux ?

Oui.

Et derrière ces créneaux, vous aviez les archers, archers, qui tiraient de la flèche, flèche. Voici une flèche; et aussi, vous aviez des petits, des trous petits, des petits trous, holes, dans les murs qui étaient très très épais, où on envoyait sur l'ennemi l'huile, comprenez-vous l'huile ? L'huile : oil. Alors vous voyez sur les murs des petits trous où on pouvait envoyer l'huile. Bon.

3. KEY WORD ANALYSIS [illegible]

a) [illegible] les chevaux.
Bon. Si vous mettez, si vous mettez la monnaie d'un dollar dans votre poche, oui, alors, quelquefois vous perdez la monnaie, vous comprenez ? Vous n'avez la, vous n'avez pas de monnaie dans la poche, alors, vous, si, après ça vous mettez la main dans la poche et vous trouvez qu'il n'y a pas de monnaie, on dit la poche est vide. Vous comprenez ? Oui ? Quand la poche est vide c'est qu'il n'y a pas de monnaie, pas d'argent, pas de mouchoir, pas de clefs; vous comprenez le mot clefs ? Voyez, des clefs. Alors, quand la poche est vide, il faut m'excuser parce que je n'ai pas de poche dans ma jupe, mais imaginez-vous ça si vous pouvez; vous comprenez : imaginez-vous ça ? Imaginez ? Oui. Alors, imaginez-vous ça, si vous pouvez. Alors, c'est ma poche. Bon. Alors, je mets la main dedans, je mets la main dans la poche. Oui. Alors, je retire la main de la poche, mais s'il n'y a pas de clefs, pas de stylo, pas d'argent, pas de monnaie, alors je dis après ça : la poche est vide. Vous comprenez ? La poche est vide. Est-ce qu'il y a un mot en anglais qui est assez près de ce mot vide ?

...

Si vous y pensez un peu. Oui ?
Void
Oui. C'est bon. C'est très bien, très bien.

b) Bon, alors; il faut que je m'arrange pour y revenir. Que veut dire ce "re" : revenir. Venir..

...

venir, revenir.
Come back.
Bon. Il faut que je m'arrange, il faut que je me débrouille pour y revenir bientôt. Ça va ?

c) Le pays basque est une région de montagnes, mais c'est aussi une région maritime. Vous comprenez "maritime" ? Non ? Est-ce qu'il y a un mot que vous reconnaissez dans ce mot "maritime" ?

(3. By word analysis cues)

d) Examples of guesses strictly on word cues.

All right. What is "avoir peur" ? I know it is a review but I like.. Yes ?

To be afraid of.

O.K. La nuit. Elle a peur de la nuit. Savez-vous, what verb does that come from ?

To save

Savoir. What does that mean ?

To know.

To know : savoir. To know. O.K. What is another idiom that you have down a little farther as "avoir peur de" Cathy ?

...

Pardon me.

... avoir raison

We have "avoir raison", "avoir peur". Could someone continue this list ?

Avoir de raison.

e) A cause de leur négligence, leur autorité s'est affaiblie.

Bon. Traduisez la phrase.

Because of their negligence, their authority fell down.

Affaiblie, il y a un autre mot dedans, oui, c'est ça, c'est ça en anglais; et quel est l'autre mot dedans ? Répétez, répétez le mot : faible.

Faible.

Bon. Quel est le contraire du mot faible ? Les jeunes filles sont faibles. Les garçons sont

Forts.

Forts, bon c'est ça. Faible, qu'est-ce que ça veut dire en anglais faible ?

Fever ?

Non.

Weak.

Weak, c'est ça; et fort ?

Strong.

Très bien. Alors, leur autorité s'est affaiblie, qu'est-ce que ça veut dire ?

Weakened.

Continuez à lire.

(3. By word analysis cues)

f) Maintenant, mes amis, un petit dialogue de révision. Vous comprenez le mot révision ? Oui. Si vous pouvez faire le diagnostic de vos révisions. La révision

- To advise.

No, that is a verb. O.K. ... Something else about this guess is very important for us to know. When you are trying to guess the meaning of a french word, you must first of all, when you start guessing, determine what kind or word it is, whether or not the word means something What kind of word is this ? Now, what kind of word ..

A noun

4. BY TYPES OF DEFINITION

a) (example)
Est-ce qu'il y avait des gratte-ciel ?
Qu'est-ce que c'est ? A New-York, il y a beaucoup, beaucoup de gratte-ciel.

b) (instrument)
Gants. C'est pour les mains. Ca couvre les mains.

c) (situation and purpose)
Onze : un bateau. Regardez Guillaume, un bateau, voici un bateau. Ce bateau va dans l'océan, Guillaume, c'est un bateau; on peut faire des voyages sur un bateau.

d) Au numéro trois. Le pneu arrière. Arrière, ça veut dire back. Le pneu, c'est une chose qui est sur la roue d'une voiture, d'une bicyclette ou d'un scooter : the rear tire. Pierre ?

Question dix-sept.

Tu as remarqué pneu arrière ? Question dix-sept : un pied plat. Un pied, c'est un des extrémités du corps. Chaque personne a deux pieds et plat, ça veut dire flat : a flat foot.

e) (situation)
Elle porte aussi un manteau. C'est ça. Bon. Alors, si vous entrez dans le cinéma vous avez des rangs, n'est-ce pas, alors vous avez le premier rang qui est près du film, et le dernier rang qui est loin du film. Alors pourquoi François, François ne va-t-il pas au dernier rang ? François, ici n'est-ce pas il va au cinéma, pourquoi ne prend-il pas le dernier rang ? Oui ?

f) Et commence à travailler. Alors qu'est-ce qu'une autre chose qu'on avale ? Ici, c'est un bol de soupe et Monsieur... l'avale. Alors qu'est-ce qu'une autre chose qu'une personne avale ? Un bol de soupe, les choses que vous mangez, n'est-ce pas, par exemple quoi d'autre mangez-vous ? Vous avalez toutes les choses que vous mangez n'est-ce pas ? Alors quelles sont les autres choses que vous mangez ?

(4. by type of definition)

g) Non, vous prenez le déjeuner à l'école; mais écoutez, vous prenez le petit déjeuner le matin, le déjeuner à midi, en général vers quatre heures, trois heures et demi, quatre heures de l'après-midi vous prenez un petit repas, quand vous rentrez chez vous après l'école, vous prenez un petit repas, par exemple du lait,un gâteau, quelque chose comme ça, alors cela s'appelle , cela s'appelle un goûter. Alors qu'est-ce que cela veut dire un goûter ? Oui ?

Taste

It means to taste, but what else could you tell me it means from my description. Yes ?

A snack.

A snack, right. Goûter. And you can see where the word comes from. Goûter , the verb is to taste and un goûter a snack O.K. All right.

h) (situation and purpose)
Alors écoutez, en classe est-ce que vous aimez mieux le premier rang ou le dernier rang. Vous comprenez le rang. En général en classe ou dans un théâtre, au cinéma, vous avez des rangs pour les personnes, pour s'asseoir; alors en classe, aimez-vous mieux le premier rang ou le dernier rang ?

Le dernier rang

Le dernier rang. Pourquoi aimez-vous mieux le dernier rang ?

i) (example)
Non, ils ne la cherchent pas. Vos soeurs perdent-elles leurs affaires ? vous comprenez leurs affaires ? Ce sont les cahiers, les sacs, les papiers, les crayons. Alors, vos soeurs perdent-elles leurs affaires ? Michel

...

Vos soeurs perdent-elles leurs affaires ?

Non, elles ne le perdent pas

Leurs affaires

Elles ne les perdent pas.

Elles ne les perdent pas. Les jeunes filles commencent-elles le roman aujourd'hui ? Les jeunes filles commencent-elles le roman aujourd'hui ? Brandy ?

(4. By type of definition)

j) (association)
C'est une histoire de Louis et d'un docteur; un docteur, c'est un dentiste, vous comprenez ? Alors, vous comprenez le rendez-vous, n'est-ce pas, une personne a un rendez-vous avec, chez le dentiste, n'est-ce pas, bon. Alors, c'est Louis. Louis attend quelques minutes...

k) (example)
Qu'est-ce que c'est le Vicomte ?
Le vicomte, alors vous n'avez jamais entendu parler du mot Vicomte, Roxane ? Oui. C'est de la noblesse. Oui. Vous avez des Princes, puis, plus bas dans la hiérarchie, vous avez des Comtes, les Vicomtes etc.. Bon, alors maintenant je vais vous lire le second paragraphe.
(she reads from Sire Vicomte... to grand tort pour vous)

l) D'abord, je voudrais bien vous dire, c'est une petite histoire qui a été écrite au moyen-âge. Vous comprenez "au Moyen-Age", et on y décrit, on y décrit les moeurs, les manières de vivre de ce temps-là, vous comprenez ? Et c'était écrit, vous savez, au temps des troubadours; Vous comprenez ça : des troubadours ? quand on est allé de Palais à Palais et on a chanté, et on a chanté tout ce qui est arrivé, oui ? Il n'y avait pas à cette époque de radio, de télévision, vous comprenez ? Et puis, de cette manière on a pu savoir tout ce qui est arrivé dans ce petit village comme ça, oui. Et c'était vraiment le commencement de la littérature française après les chansons de Roland. Vous avez entendu parler des chansons de Roland ? C'est aussi des poésies, c'était le commencement de la poésie française.

m) Une cave, c'est un endroit où les jeunes gens, n'est-ce pas, les étudiants aiment se réunir pour chanter.

5. BY CONTEXT CUES

a) Très bien. C'est très bien. Un moment. Mais comment est-ce qu'il ferme la porte ? Renaud ?
Il ferme au clef.
Il la ferme à clef. Qu'est-ce que c'est la clef ?
Key
Très bien. Oui.
Comment est-ce qu'on met du pain et du vin ?.
Comment est-ce qu'on lui apporte de la nourriture ? Oui
Il met, il a mis...
Alors, si la porte est fermée, si vous restez dans cette salle comme prisonnière, oui, et la porte est fermée à clef, oui et vous avez besoin de la viande, de l'eau, du vin etc.. comment est-ce qu'on peut entrer dans la salle ?
Avec la clef.
Avec la clef. Puis, après ça qu'est-ce qu'on fait avec la porte ?

b) ... Ils vont faire une promenade en voiture, mais pour que la voiture marche, il faut de l'essence. Vous mettez de l'essence, dans la voiture. What do you put in the car ?

c) .. On peut en acheter.
Qu'est-ce qu'il faut pour acheter quelque chose ? Qu'est-ce qu'il faut ?
pour acheter ?
Oui, vous achetez quelque chose... Qu'est-ce qu'il y a dans la portefeuille ?
de l'argent ?

d) Non, ça c'est une personne, c'est qui est dans la maison, Pierre, mais les lunettes, Suzanne dit que les lunettes sont dans la maison, où par exemple dans la maison ? Oui, Richard ?
Dans la, à la bureau d'Yvonne.
de François, bien, dans le bureau de François, oui.
Elles sont dans la salle de bains.
Elles sont dans la salle de bains. Ecoutez, si elles sont dans la salle de bains, pourquoi a-t-il mis ses lunettes dans la salle de bains ? Par exemple, . qu'est-ce qu'il a fait ? Qu'est-ce qu'il a fait ? Il a laissé, il a laissé ses lunettes dans la salle de bains, alors qu'est-ce qu'il a fait pendant qu'il les a laissées ? Oui ?

(5. By context cues)

d) (continued)
Il brosse les cheveux.
Il se brosse les cheveux, bien ou ?
Il .... se brosse ses dents ?
Il se brosse les dents.
Il se lave son visage.
Il se lave le visage, c'est ça. Alors ça c'est la raison qu'il les a laissées dans la salle de bains.

e) Est-ce qu'il y avait beaucoup de monde à la grotte pour visiter ?
Oui, il y avait beaucoup de monde.
Oui, parce qu'il y avait une cinquantaine de voitures. Une autre chose qui vous dit qu'il y avait beaucoup de monde à la grotte ?
On faisait la queue.
Queue. C'était la queue. Et combien de temps ont-ils attendu avant d'entrer ?
Ils ont attendu une heure.
Oui. Ils ont attendu au moins une heure. Alors ça veut dire, n'est-ce pas qu'il y avait beaucoup de monde à la grotte.

f) Est-ce qu'il faisait chaud ?
Il faisait plutôt chaud.
Plutôt chaud. Qu'est-ce que ça veut dire "plutôt chaud "? Est-ce que c'est assez chaud, très chaud ?
Très chaud.
Très chaud, Oui. Il faisait plutôt chaud, plutôt chaud que froid, plutôt chaud que frais; il faisait plutôt chaud.

g) Bon. Est-ce que la route était très large, ou est-ce que la route était assez étroite ?
très
Elle était
Elle était très
étroite
étroite
étroite. Etroite est le contraire de large. Vous avez : l'avenue est large et la petite route est étroite.
Prononcez : étroite
étroite
étroite. Il y avait juste assez de place entre le rocher et la rivière; alors, cela veut dire que la route était assez étroite. Excusez-moi, Monsieur, je ne savais pas que vous aviez été absent. Relisez le premier paragraphe.

APPENDIX B

FILL-IN TEST

NAME________________________ DATE__________ SCHOOL_______________ CLASS______

INSTRUCTIONS

1. Read the following passage and fill in the blanks as you go along.
2. Next to each blank there is a pair of brackets, like this: [ ]. Use the space between the brackets to show how sure you feel about your answers.

"U" stands for "unsure."
"S" stands for "sure."
"0" stands for neither unsure nor sure.

Work as rapidly as you can and do not worry about any blank for very long. You may go back and make changes on your answer sheet.

Only ONE word is supposed to go into each blank. Do not be influenced by the length of the blanks. They are the same length for both long and short words.

The Bear that Came for Supper

adapted from Robert Franklin Leslie

I met Bosco in the dense ____________________[ ] near Mt. Robson in Western Canada. ____________________[ ] the end of a long day of ____________________[ ], I had made a lean-to in a ____________________[ ] beside a stream and was ____________________[ ] to fish for supper. Then I looked ____________________[ ] -- and there he was: an enormous black bear, ____________________[ ] the clearing within thirty yards.

____________________[ ] wasn't Bosco to me yet. My provisions ____________________[ ] not safe. I was unarmed. However, I ____________________[ ] to go about my fishing. The ____________________[ ] came along.

(CONTINUE ON NEXT PAGE)

B-2

Last Name____________________

I've lived with ____________________[ ] creatures for thirty years, respecting them. Now I let him see ____________________[ ] reason for all of the ____________________[ ], deliberate moves I made. Soon he ____________________[ ] sitting on his haunches less ____________________[ ] five feet away, intensely interested in my ____________________[ ]. When I landed a fourteen-inch fish, I ____________________[ ] it to him. He gulped it without ____________________[ ] to chew. When I started to ____________________[ ] again, he moved closer, planted ____________________[ ] well-upholstered bottom on the grass ____________________[ ] my boot, and leaned half his ____________________[ ] against my right leg!

I pulled my ____________________[ ] along the stream and got another strike. ____________________[ ] reeling in, I eased over a yard, ____________________[ ] the bear would grab fish, line, rod, ____________________[ ] maybe me. But he didn't. His ____________________[ ] and dignity were regal as he ____________________[ ] rocking back and forth, watching carefully. ____________________[ ] I released the trout from the ____________________[ ] he bawled a long, loud ____________________[ ]. I shakily dropped the wriggling fish into the ____________________[ ] of my "guest."

FILL-IN TEST-II

NAME____________________DATE__________________SCHOOL__________________CLASS________

INSTRUCTIONS

1. Read the following passage and fill in the blanks as you go along.
2. Next to each blank there is a pair of brackets, like this: [ ]. Use the space between the brackets to show how sure you feel about your answers.

"U" stands for "unsure."
"S" stands for "sure."
"O" stands for neither unsure nor sure.

Work as rapidly as you can and do not worry about any blank for very long. You may go back and make changes on your answer sheet.

Only ONE word is supposed to go into each blank. Do not be influenced by the length of the blanks. They are the same length for both long and short words.

The Bear that Came for Supper (CONCLUDED)

adapted from Robert Franklin Leslie

When drizzling darkness set in ______________[ ] was still fishing for that ______________[ ]. I was fascinated by his gentle ______________[ ] and his enormous appetite. I began to ______________[ ] of him in a friendly ______________[ ] as Big Bosco, and I did't mind ______________[ ] he followed me back to camp.

After ______________[ ] I enlarged the fire. I sat ______________[the sleeping bag under the waterproof ______________[ ] and lit my pipe. All this time Bosco ______________[ ] just a little outside the heat of the ______________[ ]. At the very moment that I was ______________[ ]

(CONTINUE ON NEXT PAGE)

Last Name____________________

settled,he walked over and sat down beside me. Overlooking the ______________[ ] of wet fur, I rather ______________[ ] his warmth. We sat close together, ______________[ ] the shelter, on the sleeping ______________[ ]. I listened to the rain thumping on ______________[ ] canvas. It sounded like the steady, powerful ______________[ ] of the heartbeat beneath Bosco's thick ______________[ ]. When smoke blew our way, he snorted ______________[ ] sneezed. I imitated almost all of his ______________[ ] movements--even sneezing and snorting. I swayed my ______________[ ] in every direction, sniffing the ______________[ ] as he did.

The very ______________[ ] afternoon I sensed something wrong. Bosco did'nt ______________[ ],but clung to my heels. I was ______________[ ] over a streamside campsite,when the big ______________[ ] aboutfaced and broke into a headlong, ______________[ ] run up the hill we had ______________[descended. I did not call to ______________[ ] Bosco as he went over the ______________[ ]. He did not look back once. ______________[ ] left behind a relationship I ______________[ ] treasure; even though I will never see him again.

APPENDIX C

BIAS CHECK LIST

It is natural and, therefore, expected that a number of factors affect the thinking and feeling of every teacher about his pupils. These factors tend to generate general impressions and attitudes which may spill over into making assessments on specific scales. If, however, you make yourself as aware as possible of the possible influence of these factors, it is very likely that the biasing factors will be reduced to a minimum when you assign ratings on the scales discussed here.

1. Does the physical appearance of this pupil attract or repel you? Does it arouse pity or sympathy? Is the pupil's physical size unusual and does it effect you in some way?

2. Are you prejudiced against or in favor of this pupil because of his neatness or sloppiness in dress, work habits, and manners?

3. Does the pupil exhibit any special characteristics or friendliness and kindness or hostility and selfishness to his classmates or teachers? Does this affect your attitude toward him?

4. Does the pupil display an attitude (positive or negative) toward school, toward teachers, or toward you that might affect your assessments?

5. Have you spoken with the student's parents? Have conversations with his parents affected your attitude toward the pupil? Do you feel this pupil's parents have a realistic assessment of their child? Have your contacts with the pupil's parents helped you understand him? Have his parents attempted to persuade you to change your attitude toward him?

6. Have you discussed this pupil with other teachers, guidance personnel, or supervisory personnel? Do others share your impressions and assessments of the pupil? Have you learned facts about the pupil from others that have affected your attitude toward him? Do you think your perception of the pupil is more nearly correct than the perceptions you have obtained from others? (Since we are interested in your ratings, we hope you will "stick to your guns," if it seems appropriate to you.)

7. Have you examined the pupil's files; looked at his IQ, his standardized test scores, grades in other subjects? Do you feel that this pupil's record actually corresponds to his ability and his achievement? Have you entertained the idea that this pupil under-achieves or over-achieves on tests? Or that he impresses other teachers in a manner that is not consonant with his ability and achievement? (Remember, please: We are interested in YOUR assessment of the pupil.)

8. Do you tend to sympathize and identify with this student? Do you wish him well in achieving his goals? Does he, perhaps, "rub you the wrong way" and you almost wish he would "get lost"?

9. Do you feel that this pupil's performance and test scores in your class really reflect what this student has learned and really knows? Can you think of any reason why you should feel that his performance is not in consonance with what he has learned? (Again, we are more interested in your impression than in his test scores, if there is a difference between the two.)

APPENDIX D

TABLE D-1

Intercorrelations among Measurements of Inference-Making, General Ability and Foreign Language Achievement

Rockville Center Class 43 - Grade 9-1	V A R I A B L E S												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Inference Willingness-Rating 1	100	100	90	40	42	46	09	36	03	47	67	52	60
Inference Correctness-Rating 2		100	89	43	44	50	08	39	04	45	65	53	61
Inference Verific.-Rating 3			100	50	46	28	10	32	06	74	85	52	82
Cloze I - Acceptable 4				100	81	35	61	68	17	39	32	79	40
Cloze I - Identical 5					100	51	34	54	01	42	32	68	40
Cloze I - Certainty Ratings 6						100	31	56	60	23	29	32	14
Cloze II - Acceptable 7							100	89	29	03	08	57	06
Cloze II - Identical 8								100	42	12	04	70	12
Cloze II - Certainty Ratings 9									100	07	01	10	09
Brightness - Rating 10										100	81	18	29
Language Aptitude - Rating 11											100	31	89
Otis IQ 12												100	29
Final Grade in French 13													100
Largest N	18	17	18	15	15	15	15	15	15	18	18	20	18
$\overline{X}$	3.61	3.65	3.61	22.20	13.07	39.87	21.40	11.00	40.07	3.56	3.56	112.95	74.67
σ	0.76	0.76	0.68	3.69	3.23	10.45	4.88	3.10	9.15	0.76	0.76	11.57	10.93

for n = 15 $p = .05$ when $r \geq 50$
$p = .01$ when $r \geq 62$

for n = 20 $p = .05$ when $r \geq 43$
$p = .01$ when $r \geq 55$

TABLE D-2

Intercorrelations among Measurements of Inference-Making, General Ability and Foreign Language Achievement

Rockville Center Class 40 - Grade 7-1	VARIABLES												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Inference Willingness-Rating 1	100	100	89	59	30	12	32	40	07	75	75	42	78
Inference Correctness-Rating 2		100	89	59	30	12	32	40	07	75	75	42	78
Inference Verific.-Rating 3			100	73	41	29	32	46	18	83	83	61	80
Cloze I - Acceptable 4				100	69	20	66	55	14	30	30	73	38
Cloze I - Identical 5					100	13	80	77	21	07	07	13	09
Cloze I - Certainty Ratings 6						100	24	29	54	29	29	36	38
Cloze II - Acceptable 7							100	84	06	13	13	24	03
Cloze II - Identical 8								100	19	06	06	09	06
Cloze II - Certainty Ratings 9									100	00	00	14	05
Brightness - Rating 10										100	100	23	90
Language Aptitude - Rating 11											100	23	90
Otis IQ 12												100	20
Final Grade in French 13													100
Largest N	15	15	15	15	15	15	15	15	15	15	15	15	15
$\overline{X}$	2.87	2.87	2.80	22.60	13.93	41.53	23.33	12.20	42.33	2.67	2.67	126.07	83.93
σ	0.50	0.50	0.54	4.39	3.97	8.67	3.36	2.79	8.00	0.60	0.60	8.09	7.73

for n = 15 $p = .05$ when $r \geq 50$
$p = .01$ when $r \geq 62$

On this and on subsequent tables decimal points are omitted in the correlations.

TABLE D-3

Intercorrelations among Measurements of Inference-Making, General Ability and Foreign Language Achievement

Rockville Center Class 44 - Grade 9-2		V A R I A B L E S											
		1	2	3	4	5	6	7	8	9	10	11	12
Inference Willingness-Rating	1	100	100	89	01	04	27	66	72	74	52	52	12
Inference Correctness-Rating	2		100	89	01	04	27	66	72	74	52	52	12
Inference Verific.-Rating	3			100	03	09	23	60	65	77	50	63	08
Cloze I - Acceptable	4				100	43	07	24	15	03	28	24	63
Cloze I - Identical	5					100	59	45	31	32	45	30	76
Cloze I - Certainty Ratings	6						100	43	36	47	22	08	24
Brightness - Rating	7							100	94	81	54	57	39
Cloze II - Identical	8								100	81	60	63	23
Final Grade in French	9									100	56	67	26
MLA - ETS - Listening	10										100	73	33
Profic.-Reading	11											100	46
Speaking	12												100
Largest N		21	21	20	19	19	19	21	21	21	22	22	17
$\overline{X}$		2.81	2.81	2.80	24.68	13.58	43.89	3.14	3.10	78.19	32.68	33.50	38.41
σ		0.59	0.59	0.68	2.25	2.43	11.23	0.56	0.61	6.76	5.72	4.73	4.12

for n = 17 $p = .05$ when $r > 47$
$p = .01$ when $r \geq 59$

TABLE D-4

Intercorrelations among Measurements of Inference-Making, General Ability and Foreign Language Achievement

Rockville Center Class 52 - Grade 9-1		VARIABLES									
		1	2	3	4	5	6	7	8	9	10
Cloze I - Acceptable	1	100	71	72	49	55	43	17	34	57	16
Cloze I - Identical	2		100	62	30	49	34	10	33	02	19
Cloze I - Certainty Ratings	3			100	48	29	66	53	27	54	61
Cloze II - Acceptable	4				100	71	80	39	12	10	30
Cloze II - Identical	5					100	46	01	32	18	05
Cloze II - Certainty Ratings	6						100	46	32	06	48
Brightness - Rating	7							100	76	14	75
Language Aptitude - Rating	8								100	20	65
Otis IQ	9									100	28
Final Grade in French	10										100
Largest N		10	10	10	18	18	18	24	24	24	24
$\overline{X}$		20.20	10.00	38.90	20.61	11.89	35.00	2.54	2.67	115.50	80.29
σ		5.25	2.41	13.75	4.66	3.62	16.91	0.64	0.62	8.85	8.12

for $n = 10$ $p = .05$ when $r > 60$
$p = .01$ when $r \geq 74$

for $n = 24$ $p = .05$ when $r > 40$
$p = .01$ when $r \geq 51$

TABLE D-5

Intercorrelations among Measurements of Inference-Making, General Ability and Foreign Language Achievement

Scarsdale Class 82 - Grade 8-2	V A R I A B L E S									
	1	2	3	4	5	6	7	8	9	10
Inference Willingness-Rating 1	100	78	25	31	59	14	39	52	45	66
Inference Correctness-Rating 2		100	25	62	52	28	41	42	34	38
Inference Verific.-Rating 3			100	45	30	14	34	52	43	35
Cloze I - Acceptable 4				100	81	37	27	07	41	10
Cloze I - Identical 5					100	34	28	16	23	53
Cloze I - Certainty Ratings 6						100	15	16	37	03
Cloze II - Acceptable 7							100	61	58	69
Cloze II - Identical 8								100	75	77
Cloze II - Certainty Ratings 9									100	75
Brightness - Rating 10										100
Largest N	23	23	23	9	9	9	25	25	27	16
$\overline{X}$	23.78	14.09	45.35	22.78	10.67	32.33	90.30	23.48	26.52	35.56
σ	3.36	3.01	6.30	3.94	2.58	17.00	11.39	8.26	7.63	5.89

Note: This class had a change of teachers in the middle of the program. Explanation in the text.

for n = 9 $p = .05$ when $r > 63$
$p = .01$ when $r \geq 77$

for n = 27 $p = .05$ when $r > 37$
$p = .01$ when $r \geq 49$

TABLE D-6

Intercorrelations among Measurements of Inference-Making, General Ability and Foreign Language Achievement

Rockville Center Class 51 - Grade 7-2		V A R I A B L E S									
		1	2	3	4	5	6	7	8	9	10
Cloze I - Acceptable	1	100	86	44	73	61	30	24	12	40	33
Cloze I - Identical	2		100	38	79	61	35	02	02	56	27
Cloze I - Certainty Ratings	3			100	17	20	57	12	23	02	15
Cloze II - Acceptable	4				100	79	23	01	01	56	13
Cloze II - Identical	5					100	39	22	21	45	31
Cloze II - Certainty Ratings	6						100	09	14	31	12
Brightness - Rating	7							100	83	22	78
Language Aptitude-Rating	8								100	16	86
Otis IQ	9									100	14
Final Grade in French	10										100
Largest N		16	16	16	16	16	16	18	18	18	18
$\overline{X}$		22.56	11.19	38.00	24.88	13.56	41.63	3.06	3.11	123.44	81.77
σ		4.39	3.24	12.06	3.92	2.45	13.82	0.70	0.66	6.79	9.36

for n = 16 p = .05 when $r > 48$
p = .01 when $r \geq 61$

TABLE D-7

Intercorrelations among Measurements of Inference-Making, General Ability and Foreign Language Achievement

Scarsdale - Control Group Class 61 - Grade 8-1	VARIABLES								
	1	2	3	4	5	6	7	8	9
Inference Willingness-Rating 1	100	69	38	01	20	04	45	34	21
Inference Correctness-Rating 2		100	29	18	33	23	72	57	27
Inference Verific.-Rating 3			100	49	09	28	10	38	10
Cloze I - Acceptable 4				100	75	65	28	09	69
Cloze I - Identical 5					100	79	33	13	81
Cloze I - Certainty Ratings 6						100	19	13	67
Brightness - Rating 7							100	57	40
Language Aptitude - Rating 8								100	27
SCAT - Total Scores 9									100
Largest N	24	24	24	26	26	26	24	24	26
$\overline{X}$	3.04	3.13	3.00	91.04	79.85	85.52	3.04	3.04	89.13
σ	0.68	0.53	0.82	10.74	17.34	12.03	0.54	0.54	9.70

for n = 24 $p = .05$ when $r \geq 47$
$p = .01$ when $r \geq 59$

TABLE D-8

Intercorrelations among Measurements of Inference-Making, General Ability and Foreign Language Achievement

Scarsdale - Control Group Class 60 - Grade 7-1		VARIABLES								
		1	2	3	4	5	6	7	8	9
Inference Willingness-Rating	1	100	64	52	71	69	50	74	69	44
Inference Correctness-Rating	2		100	76	53	50	38	86	64	37
Inference Verific.-Rating	3			100	57	65	26	76	70	27
Cloze I - Acceptable	4				100	87	69	70	63	67
Cloze I - Identical	5					100	60	63	60	60
Cloze I - Certainty Ratings	6						100	55	51	96
Brightness - Rating	7							100	86	54
Language Aptitude - Rating	8								100	44
Otis IQ	9									100
Largest N		26	26	26	26	26	26	26	26	26
$\overline{X}$		3.04	2.96	3.00	83.58	85.38	86.92	3.04	3.04	88.83
σ		0.81	0.90	0.73	18.15	18.96	14.17	0.90	0.90	13.76

for $n = 26$ $p = .05$ when $r > 38$
$p = .01$ when $r \geq 49$

TABLE D-9

Intercorrelations among Measurements of Inference-Making, General Ability and Foreign Language Achievement

Scarsdale Class 70 - Grade 7-0		VARIABLES								
		1	2	3	4	5	6	7	8	9
Inference Willingness-Rating	1	100	78	88	31	37	40	67	83	59
Inference Correctness-Rating	2		100	79	32	29	44	78	78	71
Inference Verific. - Rating	3			100	38	43	45	76	88	81
Cloze I - Acceptable	4				100	18	12	27	09	45
Cloze I - Identical	5					100	82	36	41	62
Cloze I - Certainty Ratings	6						100	38	44	73
Brightness - Rating	7							100	78	57
Language Aptitude - Rating	8								100	60
SCAT - Total Scores	9									100
Largest N		24	24	13	23	23	23	24	24	23
$\overline{X}$		3.00	3.00	3.00	83.13	78.15	84.93	3.00	3.00	90.39
σ		0.87	0.87	1.18	15.76	16.66	19.03	0.87	0.87	8.68

for $n = 13$ $p = .05$ when $r>51$
$p = .01$ when $r \geq 64$

for $n = 24$ $p = .05$ when $r>40$
$p = .01$ when $r \geq 51$

TABLE D-10

Intercorrelations among Measurements of Inference-Making, General Ability and Foreign Language Achievement

Rockville Center Class 41 - Grade 7-2	VARIABLES					
	1	2	3	4	5	6
Inference Willingness-Rating 1	100	100	77	70	49	76
Inference Correctness-Rating 2		100	73	64	51	72
Inference Verific.-Rating 3			100	83	68	85
Brightness - Rating 4				100	86	95
Language Aptitude - Rating 5					100	79
Final Grade in French 6						100
Largest N	18	17	18	18	18	18
$\bar{X}$	3.06	3.00	2.94	2.89	2.89	83.72
σ	0.62	0.59	0.70	0.66	0.57	8.90

for $n = 17$ $p = .05$ when $r \geq 47$
$p = .01$ when $r \geq 59$

TABLE D-11

Intercorrelations among Measurements of Inference-Making, General Ability and Foreign Language Achievement

Rockville Center Class 50 - Grade 7-1		VARIABLES			
		1	2	3	4
Brightness - Rating	1	100	89	26	88
Language Aptitude - Rating	2		100	30	87
Otis IQ	3			100	29
Final Grade in French	4				100
Largest N		18	18	15	18
$\bar{X}$		3.00	2.94	122.73	78.22
σ		0.67	1.03	6.06	12.73

for $n = 15$ $p = .05$ when $r \geq 50$
$p = .01$ when $r \geq 62$

APPENDIX E

VOCABULARY TEST A

B-1

Teacher ____________________

Name ____________________ Date ____________________ School ____________________ Class __________

Here is a list of expressions in French. You are asked to write beside each expression its approximate meaning in English. Give the meaning in natural, everyday words. Put down several possibilities if you feel it necessary. If you can't guess the meaning, but think you know what kind of word or words are in the expression, write your idea in the answer space.

1. il m'a initié ____________________
2. il fournit ____________________
3. le produit ____________________
4. nous possédions ____________________
5. une réserve ____________________
6. augmenter ____________________
7. il manifeste ____________________
8. une grande délicatesse ____________________
9. des victuailles ____________________
10. une dette ____________________
11. il l'obligeait ____________________
12. une provision ____________________
13. disponibles ____________________
14. une tâche ____________________
15. provenant de ____________________
16. une coupe de bois ____________________
17. reparti ____________________
18. il s'agit de ____________________
19. de but en blanc ____________________
20. lui imposer ____________________
21. selon laquelle ____________________
22. pendant l'hiver ____________________
23. entre nous ____________________
24. le pas de sa porte
25. nous rendions service ____________________
26. peut-être ____________________
27. deux parties ____________________
28. il exécute ____________________
29. les contractants ____________________
30. abondante ____________________
31. du combustible ____________________
32. il méritait ____________________
33. ces occasions ____________________
34. par exemple ____________________
35. l'offenser ____________________
36. en fournissant ____________________
37. nous assurions ____________________
38. quelques disques ____________________
39. une convention ____________________
40. le matériel brut ____________________
41. à court d'argent ____________________
42. en déposant ____________________
43. il ne songerait pas à ____________________
44. donc ____________________
45. ce serait ____________________
46. ensuite ____________________
47. un mensonge ____________________
48. un voisin ____________________
49. laisser entendre ____________________
50. grâce a Jean ____________________

E-2

READING TEST

NAME____________________ DATE________________ SCHOOL_________________ CLASS______

INSTRUCTIONS

1. Read the following passage for meaning.
2. You will be asked to answer some questions at the end.

J'avais 14 ans quand mon père m'initia au système des "moitiés". Il s'agit d'une convention entre deux parties selon laquelle l'une fournit le matériel brut et l'autre exécute la tâche. Le produit du travail est ensuite réparti par moitiés entre les deux contractants. Pendant tout un hiver, nous avions débité, pour un voisin, du bois provenant de sa coupe. Nous possédions une abondante réserve de combustible et n'avions pas besoin de l'augmenter. Mais cet homme, victime d'un fâcheux coup du sort, méritait qu'on l'aide.

Dans notre petit village on manifeste en ces occasions une grande délicatesse. Personne ne songerait à faire de but en blanc la charité à son voisin, en déposant par exemple un panier de victuailles sur le pas de sa porte. Ce serait l'offenser et lui imposer une dette de reconnaissance.

Mon père décida donc de laisser entendre que nous étions à court de bois, et en nous le fournissant en compte à demi, cet homme à qui nous rendions service nous obligeait. Grâce à ce petit mensonge, nous lui assurions une provision de bois pour un hiver ou deux, avec peut-être un supplément de quelques cordes disponibles pour la vente.

E-3

Teacher________

Name________________Date______________ School___________Date____________

QUESTIONS ON READING

1. WHERE Location (s), place(s) of the action or description.

____

____

____

2. WHEN Time (time of day, date, season, etc.)of the action or description.

____

____

____

3. WHO Persons or living things who play a part in the action or description.

____

____

4. WHAT Objects or non-living things which are important to the action or description.

____

____

5. HOW (What happens?) Events or situation described or narrated.

____

____

____

____

6. WHY Point or general idea of the reading.

____

____

____

____

____

____

VOCABULARY TEST B Teacher__________

Name________________________ Date________________ School____________________ Class________

Here is a list of expressions in French. You are asked to write beside each expression its approximate meaning in English. Give the meaning in natural, everyday words. Put down several possibilities if you feel it necessary. If you can't guess the meaning, but think you know what kind of word or words are in the expression, write your idea in the answer space.

1. longtemps______________________________
2. une localité______________________________
3. il arrêta______________________________
4. des empreintes______________________________
5. policière______________________________
6. elle a permis______________________________
7. des enquêtes______________________________
8. pénible______________________________
9. des mois de labeur______________________________
10. un canon de revolver______________________________
11. une chambre forte______________________________
12. une bijouterie______________________________
13. la fuite______________________________
14. il lui fallait______________________________
15. il brancha______________________________
16. il n'en revenait pas______________________________
17. afin de______________________________
18. une bague de fiançailles______________________________
19. un plateau______________________________
20. en trombe______________________________
21. menées à bien______________________________
22. nez à nez______________________________
23. faire croire à______________________________
24. de façon à______________________________
25. autrefois______________________________
26. brusquement______________________________
27. un policier______________________________
28. ils ne contenaient pas______________________________
29. en fait______________________________
30. des organismes______________________________
31. l'arrestation______________________________
32. ils nécéssitaient______________________________
33. et même______________________________
34. fastidieux______________________________
35. un bijoutier______________________________
36. un malfaiteur______________________________
37. le malheureux______________________________
38. fermer boutique______________________________
39. nombre de pays______________________________
40. il rafla______________________________
41. il prit______________________________
42. des gants______________________________
43. comment______________________________
44. un commerçant______________________________
45. un casier judiciaire______________________________
46. sur-le-champ______________________________
47. il enferma______________________________
48. plus tard______________________________
49. donc______________________________
50. un fichier______________________________

E-5

READING TEST

NAME____________________ Date____________ SCHOOL____________________ CLASS________

INSTRUCTIONS

1. Read the following passage for meaning.
2. You will be asked to answer some questions at the end.

Il n'y a pas trés longtemps de cela, dans une petite ville de l'ouest, un bijoutier était en train de fermer boutique quand un client arriva en trombe; il lui fallait sur-le-champ une bague de fiançailles. Le commerçant sortit un plateau de bagues et, brusquement, se trouva nez à nez avec le canon d'un revolver. Le malfaiteur enferma le malheureux dans la chambre forte du magasin, rafla pour $20,000 de bijoux, brancha le système d'alarme de façon à faire croire à la police que la bijouterie était fermée, et prit la fuite.

Trois heures plus tard, dans une autre localité, à 50 milles de là, un policier arrêta l'homme, qui n'en revenait pas. Il n'avait pas de casier judiciaire, donc les fichiers ne contenaient pas de photo de lui. Et il avait porté des gants afin de ne pas laisser d'empreintes. Comment, dans ces conditions, la police avait-elle pu le repérer?

Sa capture était due, en fait à un nouvel instrument d'investigation policière, l'Identi-Kit, ou IK(boîte à identités). Adoptée aujourd'hui par plus de 600 organismes de police, dans bon nombre de pays, cette invention a permis la prompte arrestation de quantité de criminels. Des enquêtes qui, autrefois, nécessitaient des semaines et même des mois de pénible et fastidieux labeur, sont souvent menées à bien, aujourd'hui, en quelques jours ou même en quelquelques jours ou même en quelques heures.